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Largely through the efforts of the executive committee of the Merchants' Association of New York, the finance committee of the United States Senate, upon the suggestion of Senator Aldrich, has conceded the substance of the request for a tariff commission and has reported an amendment to the proposed tariff bill, which vests in the President ample authority to create an advisory board to collect information which will be useful to Congress in tariff legislation. The clause does not provide for any salaries for this commission, but assurance has been given that adequate funds will be provided. The ridiculous spectacle now being afforded at Washington of the way a great nation goes about its tariff revision brings new weight to the argument for a tariff commission, which was published in the *Railroad Age Gazette* January 15, 1909. We said at that time that adjustment and the rumor of adjustment were alike damaging to all conservative business, and that more especially was this true when the adjustment was expected to follow a series of rather irregular hearings in which a number of frankly selfish witnesses argued before a committee which was trying to do the work of years in a few weeks and had to deal with many absurd conflicts of testimony. We suggested at that time that a tariff commission containing not to exceed five members be created, tenure of office to be during life or good behavior; that this commission be given authority to conduct such investigations and hold such hearings as it might deem necessary and to report to Congress such changes in the tariff as might appear to it desirable during the congressional session of 1911 and thence biennially. The Aldrich amendment now makes it possible for the President to create such a commission without more formality, and adds point to our suggestion that this commission be composed of two broad-gage business men, two economists of the type of Charles Francis Adams, and one federal judge; that the commissioners devote their whole time to the task before them and receive salaries commensurate with the importance of their work. The time is ripe for those of our readers who agree with us to write to their representatives in Congress about it.

The *Railroad Age Gazette's* rule for the prevention of collisions is the rigid enforcement of the block system. This, we suppose, is fairly well known. Furthermore, if the editor were to set up as a doctor he might reasonably ask that only actual cases of sickness be brought to him for consideration. Neither doctors nor magistrates can spend time on imaginary ills. However, the editor feels a lively sympathy with train despatchers, and therefore he takes pleasure in printing the following letter from a despatcher in Arkansas:

> Please give your ruling on the following question under standard rules, on single track:
>
> If No. 7's schedule is 60 miles an hour and Extra 4 gets an order to run ahead of No. 7 from A to B, how fast should No. 7 run from A to B? (2) If Extra 4 made No. 7's schedule and No. 7 should hit rear end while Extra 4 was running, who would be at fault? (3) If Extra 4 did not make 7's schedule, and 7 hit them, who would be at fault? There is no speed limit on extras.

Question 1.—The rule under Form B in the standard code requires that No. 7 shall run no faster than the extra. If there is no rule fixing a speed for extra 4 the conductor and engineman of No. 7 would have to ask the despatcher to fix a minimum limit for No. 4. If no block system is in force an order of the kind referred to would imply the maintenance, at stations reasonably near together, of a time interval, of suitable length as related to the speed of trains.

Question 2.—Assuming, as our correspondent seems to assume, that the extra made a mile a minute continuously, the collision could not occur unless No. 7 were to run faster than the rule allows, for which excessive speed the conductor and engineman of No. 7 would be responsible. If No. 7 should pass a station within less than the prescribed time interval, the man in charge of the station would also be responsible unless he took all possible means to stop the train.

Question 3.—As No. 7 is bound to limit its speed to that of the extra, the conductor and engineman of the extra have no duty to consider No. 7's schedule; they have the right to assume that, however low their speed, No. 7 will be run equally slow; they have simply to obey rule 99. This requires them to send a flagman back the moment they are delayed sufficiently to make it possible that No. 7 "may" overtake them. The question just how much time it is safe to lose before sending the man back depends on the speeds, on the length of the time interval that is required to be maintained between trains at stations, on the distances between stations, and on the degree of strictness with which the speed of trains generally is kept within the limits prescribed by the rules. As, in addition to this last point, all the men concerned are likely to take into consideration the personal peculiarities of the engineman—in other words, are likely to guess whether such and such a one will or will not run faster or slower than he ought to—the use of such orders as the one here referred to

cannot be regarded as safe except where all of the conditions above suggested are fulfilled and where the prescribed time interval is of ample length. If we were called upon to prescribe this interval we should begin with, say, 30 minutes. If stations were close together and trainmen and stationmen were all tried and careful employees we might reduce it. On most American roads, however, experience has shown that, long before the time interval has been made short enough to be satisfactory to yard masters and to other officers who wish to start every train in a hurry, the officer fixing the interval finds himself confronted with many dangers, seen and unseen; so that, if he be wise, he concludes to adopt the space interval instead. The space interval is the only rational regulation for safeguarding trains against collisions. Train orders like that here brought up can never be made reasonably safe.

TRANSCONTINENTAL FREIGHT RATES.

The transcontinental freight rate system long has been the object of constant and severe criticism. Recently it has been attacked with unusual vigor and bitterness from several sources and on a number of grounds. As a result of the decision of the Interstate Commerce Commission in the Spokane rate case, and in deference to public opinion, the traffic officers of the Harriman and Hill lines have undertaken a complete readjustment of the entire scheme of freight rates charged by them. The public has little idea of what this means. So mighty a work seldom has been attempted by traffic managers anywhere.

The transcontinental rate system is attacked on three main grounds: (1) It is said that it is unjustly discriminatory because the rates charged from the Missouri river and points farther east to points on the Pacific coast are lower than the rates charged for the shorter hauls from the East to intermediate points such as Spokane, Salt Lake City, Ogden and Denver. (2) It is charged that transcontinental rates are fixed by agreements and combinations between the carriers that are in violation of the Sherman anti-trust act, and it is reported that the Attorney-General of the United States may start prosecutions to break up the alleged unlawful combinations in addition to the suit already in progress against the Harriman lines. (3) The Interstate Commerce Commission held in the Spokane rate case that the rates to Spokane are exorbitant *per se*, and by implication that they are excessive *per se* to other intermediate points, because they yield to the carriers' excessive profits.

It will be worth while to mention some of the obstacles—certain of them, it is to be feared, insurmountable—that the carriers will meet in trying to make a readjustment that will not be subject to all these or juster criticisms.

It is indisputable that the so-called "intermediate" points are discriminated against. But the slightest reasonable consideration will show that this is not due, as is often implied and sometimes charged, to a deliberate determination by railway men to build up the commercial centers on the coast at the expense of those inland. They are not engaged in selling goods at San Francisco, Portland or Seattle, or shipping them there. They are engaged in hauling them there. They have no such affection for the business men on the coast or dislike for those at inland points that they desire to render the former greater services than they render to the latter for less money. It costs the railways more to haul goods from the East to the Pacific coast than to intermediate points. The traffic managers are working for the railways, and not for the business men of the Pacific coast. As rational human beings, therefore, they naturally would exact higher rates for the more costly service to the coast than for the less costly service to inland points if they could get them. Since they accept lower rates for the more costly service there must be some condition which they at least think forces them to do so. That condition, of course, is water competition. The roads always have made lower rates from the East to the Pacific coast than to inland communities, not because they wanted to, but because it was thought that if they did not the business men on the coast would have their goods shipped by water and the roads would not get to haul them at any rate, high or low.

It is said, however, that if there ever was justification for this method of making rates it no longer exists. The popular opinion, and the attitude of many shippers, is reflected in an article by Charles Edward Russell, in *Hampton's Magazine* for May, in which the idea is ridiculed that water competition to the Pacific coast is still controlling. We commend this article to those who desire to find all the ignorance, prejudice and mendacity on the subject concentrated into a few lurid but not luminous pages. As a matter of fact, water competition is still not only controlling, but increasing. Formerly most of the goods moving from the East to the Pacific coast by water were carried in sailing vessels that went around Cape Horn or through the Straits of Magellan, and took 175 to 200 days for the trip. But in 1900 the American-Hawaiian Steamship Company put on a service of steamships from New York via the straits of Magellan, and the testimony in the Spokane rate case showed that in 1906 this company carried 115,000 tons of freight from New York to the Pacific coast. The average time made was 60 days; the commodities carried included goods of a wide variety that originated in large quantities at points as far west as Pittsburgh and Buffalo, and the rates charged were substantially less than the all-rail rates from the East to the Pacific coast. In 1907 the American-Hawaiian line inaugurated a route consisting of water carriage from New York to Coatzacoalcos, Mexico, of rail carriage from thence across Mexico to Salina Cruz, a distance of 193 miles, via the Tehuantepec National Railroad, and thence by water to Pacific coast destinations. The time by this route from New York to San Francisco is 25 days, to Portland 35 days and to Seattle 40 days. The rates are 20 to 60 per cent. less than the all-rail rates. The traffic manager of the steamship company estimated that he would be able from the start to handle 250,000 tons of freight per annum, and as the route is known to have done a big and growing business ever since it was opened, no doubt his expectation has been realized. In addition, a considerable tonnage moves in tramp vessels, the amount in 1906 being estimated at 25,000 tons. Now, of course, the total amount of traffic moving to the Pacific coast by water is but a small percentage of the amount moving by rail. But if the roads did not so adjust their rates as to meet this competition it unquestionably would grow fast even under present conditions on the water, and would rapidly attain such proportions as it already has on the Great Lakes, on which one-third of the total freight tonnage of the country is handled. There seems no escape from the conclusion which the Interstate Commerce Commission stated in the following language in its recent decision in the Spokane rate case: "It cannot be denied, in view of these uncontroverted facts, that water competition does exist and that it produces a *controlling effect* upon rates to the Pacific coast from many eastern destinations."

Conceding that water competition from the eastern seaboard, and even from points as far west of the Atlantic as Pittsburgh and Buffalo, is controlling to the Pacific coast, what good reason, it may be asked, is there why rates from places as far from the Atlantic ocean as Chicago and St. Paul should be lower to the Pacific coast than to intermediate cities? Perhaps this adjustment cannot be defended successfully as to all commodities to which it is now applied, but it is not hard to say why it exists. It is due to commercial as well as to transportation competition. Take, for example, the rates on steel and iron products. These commodities are manufactured at Pittsburgh and at points farther east, and also in the Chicago district. Water competition forces a lower rate from eastern points to the Pacific than

to Spokane and to other inland cities. If the western roads do not make as low a rate from Chicago to the Pacific coast as is made from the eastern seaboard, business men on the Pacific coast naturally will buy iron and steel from the mills in Pittsburgh and farther east in preference to the mills at Chicago, and the lines running west from Chicago will not get to haul these commodities at all; but because water competition thus forces a low rate from Chicago to the Pacific coast is not regarded as sufficient reason why the same low rate should be made to intermediate points, such as Spokane or Seattle, where this competition does not operate.

Meantime, the government is building the Panama canal largely in order to make competition by water between the Atlantic and the Pacific seaboards more severe than it is at present. Now, as F. A. Delano recently pointed out in an address to the City Club of Chicago, the tendency of water competition, whether independent of or due to governmental encouragement, is to make rail rates to inland points high as compared with rates to points having water transportation. In other words, the government, by building the Panama canal, will increase the force of water competition to the Pacific coast terminals, and will thereby make it much more difficult than it is now for the railways to frame a scheme of rates that will not put cities such as Spokane and Salt Lake City at a great disadvantage in competing against cities such as San Francisco, Portland and Seattle. The inland cities of the West, in asking the railways to put them now on an equality in rates with the cities on the Pacific coast, are asking them to overcome a disadvantage imposed by nature. When they ask, after the Panama canal is done—as they doubtless will—that the roads shall put them on an equality in rates with the coast cities having the advantage of water transportation via the canal, they will be asking the roads to overcome for them disadvantages created both by nature and by the national government. We are far from meaning to say that water transportation is not a good thing, or that its development should not be fostered from the public purse. But it does seem that for the public to lay out its money in developing facilities that inevitably will give the communities that have water transportation a relative advantage over communities that do not have it, and then to demand that the roads not only shall make comparatively unremunerative rates to meet the rates of the water carriers, but shall also make rates that will overcome the disadvantage—partly or wholly created by government—of the communities that have not water transportation is, if not acting with glaring inconsistency, at least dealing rather hardly with the railways.

There are several ways in which the railways might put an end to the purely railway discrimination against communities that have not water transportation. The transcontinental lines, for example, might raise their rates to the Pacific coast cities as high as their rates to inland points. But this would not benefit the inland points, even if the Interstate Commerce Commission would let the higher rates to the coast be maintained. For the coast jobbers would then begin to have more or all of their goods shipped from the East by water. They would not then get as fast transportation service, on the average, as they do now, but the rates they would pay would be lower on the average than they are at present, and they would still be able to undersell the jobbers of inland cities in most of the territory where the jobbers of the two classes of cities compete. The only effects of such action would be to raise a loud outcry by the people of the Pacific coast against the railways; to deprive the roads of a large amount of traffic to the coast, and to get them denounced, as they were when they raised their proportions of the through rates to the Orient to the basis of their local rates to the coast, for trying to make government regulation "odious."

The roads might equalize the rates to the coast and the inland cities by raising the former some and reducing the latter some. But while this would enable the jobbers at inland points to get goods from the East more cheaply, it probably would not enable them to meet the competition of the coast jobbers much, if any, better than now unless ocean rates to the coast were raised as much in proportion as rail rates to the coast.

Finally, the rates might be equalized by making the present rail rates from the East to the coast the maxima from the East to all inland points. The Interstate Commerce Commission in the Spokane case fixed the present rates from St. Paul and Chicago to Seattle as the maxima from the former points to Spokane on most of the commodities involved. There is only one effect that such a readjustment of rates would be sure to have: it would be sure to reduce heavily the earnings of the railways. If the rates to Spokane, Salt Lake City, Ogden, Denver, etc., were so drastically reduced it would be necessary to "grade back" all rates from the East; in other words, to reduce proportionately rates from the East to all points lying between St. Paul and the Missouri river, on the one hand, and Salt Lake City, Spokane, etc., on the other. The jobbers at the inland points believe that such a readjustment would enable them largely to increase their sales in the territory where they compete against the jobbers who are located on the Pacific coast. But if it had this effect, obviously it would reduce the sales of the Pacific coast jobbers in the competitive territory, and if it reduced the sales of the Pacific coast jobbers, it would reduce the amount of goods that they shipped from the East by water as well as by rail. The ocean carriers then would have an incentive to reduce their rates, and if they did so the shippers on the coast would again have an advantage over those at inland cities whether the railways met the reductions or not. If the railways *did not* meet the reduction they would be unable to compete in hauling goods to the coast, and would lose whatever profit, however small, that they might be able to get out of coast business, and if they *did* meet them without making proportionate reductions to all intermediate points, the intermediate points would again be placed relatively just where they stand now.

To what conclusion do all the foregoing facts point? Plainly, they point to the conclusion that there is absolutely but one way by which the inland cities can be put and kept on as advantageous a rate basis as points on the Pacific coast, and that is by the railways and the steamship lines agreeing to make and keep rates to the coast relatively as high as rates to the inland points. But as long as the steamship lines are under different control from the railways it will be to their interest to make rates to the coast that are relatively lower than those made by the railways to inland points. So we are brought up against the conclusion that the inland points can never hope permanently to enjoy relatively as advantageous rates as the coast points until the steamship lines and the railways are combined under a common control. So long as they are under a different control the coast cities will have smaller transportation bills to pay than the inland cities even if the railways should practically quit hauling freight to the coast. Rates to the coast were lower than to inland points before there were any railways; and they always will be if ocean carriers continue permanently to compete unrestrictedly against the rail carriers.

If, then, it be desirable to put inland points permanently on a rate parity with coast points, the correct policy to pursue would be to encourage the bringing of the steamship lines and the railways under common control. But what would the people on the coast say to that? What would the people of the country at large say to it? Evidently, they would vigorously oppose it, for their is a strong and growing sentiment in favor of expending the public money to increase the competition between water and rail lines. In other words, the public fosters the development of water transportation; the competition of the boats forces the railways either to quit hauling goods to the points where they meet water competi-

tion or to discriminate in their rates in favor of those points and against points not having water transportation; when the railways do thus discriminate the public denounces them for it, and when they try to get control of the boats in order to stop the discrimination they are denounced still more. So long as the public, legislatures and railway regulating bodies assume so utterly inconsistent an attitude, it is evident that the transportation disadvantages of which inland communities complain that both continue to exist and will continue to be complained of.

It is just as true that unfair discriminations between competing communities and shippers having only rail transportation cannot be prevented without some form of concerted action between the carriers, as it is that inland communities cannot be put on a rate parity with communities having water transportation without concerted action between the railways and the boat lines. It has been pointed out with wearisome reiteration that there is an irrepressible conflict between the Sherman anti-trust law, which forbids such concerted action between railways as is necessary to prevent unfair discrimination, and the Interstate Commerce law, the main purpose of which is to prevent such discrimination. Yet, as we have stated, one of the main counts in the indictment against the transcontinental roads is that they are in a combination to fix rates that is in violation of the Sherman law. Under the construction placed by the Supreme Court of the United States on the Sherman law in its decision in the Trans-Missouri Traffic Association case, it seems not improbable that the transcontinental roads, or some of them, have technically violated that law. There is no doubt that they have at times in fixing rates taken concerted action that may be in "reasonable restraint of trade"; and the Supreme Court held that "reasonable restraint of trade" was as much a violation of the Sherman law as "unreasonable restraint of trade." But if the transcontinental roads did not act together in changing rates, we should like to know how they would ever accomplish so comprehensive a readjustment of their schedules as the Interstate Commerce Commission indicated in its decision in the Spokane rate case that it thought they ought to make. If they did not act together, rates throughout the West would be in a state of utter chaos in six months. If the transcontinental roads are guilty of violations of the Sherman law then so are the railways in every section of the country. If the railways generally are violating that law then so are men and corporations engaged in every line of business, and so is every labor union in the country. No one can fairly criticize the federal department of justice for seeking to enforce the Sherman law just as it stands. That is its duty. But if it is going to seek to enforce it just as it stands against the transcontinental roads, obviously, it ought to do likewise with respect to all other roads, to all other business concerns, and to all labor unions. We are not sure but this would be the most salutary policy it could adopt, because if the Attorney-General and all the district attorneys of the United States should begin at once to prosecute all men and business concerns that there is reason to believe are violating the Sherman law, the business of the country in a very short time would be thrown into such a state of confusion and turmoil that Congress would be driven to do its plain duty of repealing or radically modifying that law.

The third charge against the transcontinental railways—that their rates to inland points are excessive per se because the roads have been making too large profits—ignores the fact that the earnings from transcontinental traffic will have in future to be spread over a much larger body of operating expenses and fixed charges than heretofore. The Chicago, Milwaukee & St. Paul recently has completed its extension to the coast. The Western Pacific soon will be finished. The Spokane, Portland & Seattle, the North Coast and other new roads are almost finished or are under construction. All the older roads in the West during the years immediately preceding the panic of 1907 expended enormous sums in building second track and branches, in increasing equipment and in making other necessary permanent improvements. These new lines, extensions and improvements and the greater competition that will result from them for traffic to and from the Pacific coast, will cause the public to be given much better and more adequate service than it has had in the past. But it will cost more in the aggregate to render the service, and, until the growth of traffic overtakes the growth of facilities, the profits of the carriers necessarily will be relatively smaller than they were prior to the panic. If this increase in the cost of rendering the service is accompanied by reductions in the rates paid for it, the profits of the roads, of course, will be reduced further. The shippers of the country will profit both by the improvements in service and the contemplated wholesale reductions in rates, if they shall be made. But that the proposed reductions in rates would not tend to promote further development of railways and further improvements in service seems to be a proposition not open to dispute. Whether they would tend so strongly to check railway development as to cause shippers and the public to lose more indirectly than they would gain directly, is more than anybody can tell.

THE LONG ISLAND.

Suburban service is generally considered one of the least profitable branches of the business of a railway, and the Long Island is unfortunate enough to have very little other business. Although carrying some freight and passengers through from Brooklyn or Long Island City to the eastern end of Long Island, this through business is but a very small proportion of the gross. As is to be expected from its situation, passenger traffic is much more important than freight traffic. In 1908, 53 per cent. of gross earnings came from passenger traffic, while 26 per cent. came from freight traffic. Expenses of handling this passenger business have been high in the past. Frequent service has been required with comparatively a short average haul. This average haul was 15 miles in 1908.

The problem of the Long Island has been so to cut down expenses of operation as to make its short-haul passenger business profitable and to colonize Long Island with small farmers and with manufacturers so as to build up its freight business. By the establishment of experimental farms conducted under scientific management the company has demonstrated that the soil of the island is well adapted to the raising of numerous classes of vegetables and garden truck, for which there is an excellent market in New York City.

The traffic departments have given wide publicity to the results of these experiments and to the advantages to the market gardener to be found on Long Island, and last year, as in recent years, the results of these efforts are to be found in the classified list of commodities carried. While the total tonnage carried amounted to 3,000,000 tons last year, a decrease of 230,000 tons from 1907, the products of agriculture furnished a total tonnage of 352,000 tons, or 13,800 tons greater than in 1907. The tonnage of both hay and vegetables show substantial increases. Products of mines furnished something over a third of the total tonnage, and it seems rather surprising that the tonnage of these products showed an increase of roughly 4 per cent. last year. The tonnage of bituminous coal in particular, which amounted to 171,000 tons, was 10 per cent. more than in 1907.

During the year, 4,748 dwelling houses, 18 factories, 368 stores and 238 miscellaneous buildings were constructed in villages on the lines of the company outside of Long Island City and Brooklyn. These figures ought to be very much increased as the tunnels of the Pennsylvania under the East river near completion. Land values on Long Island have risen in anticipation of increased transportation facilities,

and the business of the Long Island should show a similar increase.

During the past few years the road has been operated under particularly adverse conditions. Part of the line has been electrified, this electrification having been extended as far as Hempstead last year. While electrification was going on, the operation of the road, partly by electricity and partly by steam, largely increased operating costs without very materially bettering the service. Last year, however, the effects of improvements were apparently felt for the first time in the operating department.

Total operating expenses amounted to $7,300,000 in 1908 as against $8,500,000 in 1907, a decrease of over $1,200,000. The decrease was fairly evenly distributed between maintenance costs and transportation costs. Transportation amounted to $4,600,000 in 1908 as against $5,400,000 in 1907, a decrease of $800,000. Maintenance of way and structures per mile of first, second, etc. track (sidings and switch tracks being counted half) cost $1,540 as compared with $1,969 in 1907. It is impossible to compare unit costs of maintenance of equipment, since the figures for 1908 are given in accordance with the rules prescribed by the Interstate Commerce Commission and the 1907 figures in detail have not been rearranged to correspond. The totals, however, are comparable, and maintenance of equipment cost $1,300,000 last year as against $1,500,000 in the previous year.

This reduction in expenses enabled the Long Island to decrease the deficit, after paying fixed charges and rentals, from $860,000 in 1907 to $276,000 in 1908.

The number of passengers carried totaled 23,200,000 in 1908, a decrease of over 700,000 from the figures of 1907, due entirely, the annual report says, to the smaller attendance at the race tracks. The Long Island serves the different race tracks lying in the arc of a circle about Brooklyn, and in the past handled tremendous crowds of race-track goers on nearly every fine summer afternoon. After the passage of the bill prohibiting betting at the tracks this business fell off to a very large extent.

The extension of the subway, connecting the lower end of Manhattan island with Brooklyn, to the Atlantic avenue station of the Long Island has diverted probably a very large passenger business from Long Island City to the electrified lines terminating at Atlantic avenue. The evidence of this is shown by the discontinuance of the ferry between Long Island City and Wall street. It would be interesting to know whether this throwing of greater proportionate traffic on the electrified lines has anything to do with the decreased operating cost.

In 1908 the average earnings per passenger per mile amounted to 1.482 cents, an increase of 0.014 cents, while the average expenses per passenger per mile amounted to 1.439 cents, a decrease of 0.22 cents. It will be seen, therefore, that while the passenger business was carried at a loss in 1907, there were net earnings of 0.043 cents per passenger per mile in 1908.

Improvements are being carried on, and during the latter part of the year work was begun in the Glendale cut-off which connects the main line with the Montauk division at Glendale junction, and also on the freight cut-off connecting the north shore freight yard with the Montauk division at Dutch Kills creek. It is expected that both of these improvements will be completed and put in operation in 1909. The additions and improvements to the property and securities bought since 1903 have in part been paid for from the proceeds of the sale of $22,408,000 refunding mortgage bonds. In addition there has been advanced by the Pennsylvania for similar purposes $6,000,000, so that in all there has been spent $28,170,000 since 1903 for capital account, the two largest items of expenditure being for the Atlantic avenue improvements, which totaled $4,700,000, and the cost of road and real estate, which totaled $4,240,000.

The company carries on its general balance sheet for December 31, 1908, $4,400,000 as the amount due for construction and equipment purposes. This is an increase of $1,400,000 over the amount so carried in 1907, and in addition there are current liabilities amounting to $3,300,000, the current liabilities being slightly less than in 1907. Since the authorized refunding mortgage bonds left unsold are reserved for the retiring of outstanding securities it will be necessary for the Long Island to form some plan for funding its floating debt and raising cash for future improvements, but since the Long Island is a subsidiary of the Pennsylvania and can presumably borrow for current needs from the Pennsylvania, it can choose its own time for issuing new securities.

Taken in connection with the saving in expenses, the prospect of operating on a profitable basis after the completion of the Pennsylvania tunnels seems to be very good, and the outlook for the future is considerably better than it was a year ago this time.

The following table shows the results of operation for the years 1908 and 1907:

	1908.	1907.
Average mileage operated	392	392
Freight revenue	$2,540,033	$2,705,079
Passenger revenue	5,889,568	6,061,852
Total operating revenue	9,818,545	10,130,408
Maint. way and structures..	1,000,588	1,266,457
Maint. of equipment	1,295,513	1,473,832
Traffic	185,057	187,548
Transportation	4,555,504	5,353,537
Total operating expenses.....	7,267,235	8,526,585
Taxes	393,312	345,178
Rentals paid roads operated on basis of net earnings...	680,935	545,326
Net earnings	1,870,374	1,058,497
Gross income	2,087,242	1,390,567
Net income	*276,088	*858,829

*Deficit.

NEW PUBLICATIONS.

Convertible Securities. By Montgomery Rollins, author of "Money and Investments," "Tables of Bond Values," "Laws Regulating the Investment of Bank Funds," etc. 5 in. x 7¾ in.; leather. Price, $3 per single copy; in orders of ten or more, special prices will be made, including the buyer's firm card, stamped in gilt on the outside cover. For sale by Montgomery Rollins, Boston, Mass.

There has long been a need for a good handbook on convertible securities. As Mr. Rollins says in his preface, although the investment world has very generally accepted and approved of convertible securities, has become familiar with their characteristics and needs no definition as to what they are or advice about their good and bad points, yet there are many who know little or nothing about them. In general, bonds convertible into stock are more frequently encountered than other classes of convertibles. The author has made a compilation of all the various kinds of convertibles authorized and issued by American corporations, and has found that the live issues now authorized come to the rather startling total of $1,448,409,063.

To determine the market price at which it is profitable to convert these securities rather than to hold them is often a complicated study, especially for those who are not familiar with the situation. For example, in the case of the American Telephone & Telegraph Company convertibles, the price of the stock is now 133.7374. For one bond the company gives seven shares of stock and $63.84 in cash. Three bonds would call for $191.52 in cash, or $57.78 more than enough to pay for another share of stock at 133.7374, so that plan is carried out, and cash to the amount of only $57.78 is given to the bondholder.

A more common case of confusion is that arising where a convertible bond may simply be converted into stock at a specified price above par. For example, the Union Pacific convertible debenture 4s are convertible into common stock at 175. Therefore, when the stock sells at 175, the bond equivalent is 100. It is not difficult to work out the bond equivalent when the stock is selling at 160 or at 195, but it is perplexing to one who is not accustomed to it. Mr. Rollins' tables in the book at hand cover the price of Union Pacific convertibles

throughout the entire range between the stock price of 125 and the stock price of 212⅜, progressing by eighths.

The handbook gives an abstract of the provisions of each convertible; it contains an extensive appendix, comprising extracts from trustees, circulars from the companies, etc., in relation to conversion, redemption, registration, etc., and has also tables for accumulated dividends and accrued interest. It ought to have an important place in financial libraries.

Letters to the Editor.

RAIL SPECIFICATIONS.

Pittsburgh, May 3, 1909.

To the Editor of the Railroad Age Gazette:

Referring to the editorial on page 925 of the *Railroad Age Gazette*, April 30, on the new rail specifications, I note an error which I think should be corrected. You state that the angle block must weight at least 20,000 lbs., but nothing is said of the character of the foundation, which is of much importance in making drop tests "which shall in all respects be comparable." You will note in Bulletin No. 102, August, 1908, of the American Railway Engineering & Maintenance of Way Association that particular attention has been paid to the foundations in these specifications, and the manufacturers have made their drop testing machines to conform with these specifications. The specifications given in Bulletin No. 102 are the joint results of a committee representing the manufacturers and the committee on rails of the American Railway Engineering & Maintenance of Way Association.

R. Trimble,
Chief Engineer, Maintenance of Way, Penn. Lines West.

THE ADVANTAGES OF MODERATELY SUPERHEATED STEAM.

Paris, April 30, 1909.

To the Editor of the Railroad Age Gazette:

On page 789 of the *Railroad Age Gazette of* April 9 H. H. Vaughan criticizes my article on the advantages of moderately superheated steam and suggests that I do not do justice to high temperature superheat. In view of the opinions that Mr. Vaughan expresses, it is curious to find on analysis that the figures he offers in place of mine are even less favorable to the high temperature steam. For example, I estimated the boiler efficiencies for saturated steam, moderate superheat and high superheat to be respectively 60.0, 62.1 and 56.7 per cent. Mr. Vaughan considers this too high for the moderate and too low for the high superheat. For the former he suggests 61.5 per cent., while for the latter he estimates the loss of efficiency in the superheater tubes at 1 per cent., then at the end of his letter he says: ". . . in practice the application of the smoke tube superheat reduces the amount of heating surface, and this reduction should be allowed for in the estimate of the boiler efficiencies I have made. . . . This reduction of heating surface amounts to about 15 per cent." To allow for the effect of this reduction Mr. Vaughan uses a formula which reduces an efficiency of 64.8 to 60.6 per cent. and which would reduce the efficiency of the high superheat boiler from 59.0 to 54.4 per cent. That is to say, Mr. Vaughan's method, instead of giving the high temperature boiler a higher efficiency, actually gives it an efficiency some 3 per cent. less than does the method used in the original article.

Now as to the over-all efficiency of the locomotives. Mr. Vaughan says: "Mr. Fry has neglected a further and far more important consideration; namely, that the efficiency of a boiler is a function of the work it is doing. This was shown most distinctly at the St. Louis test, and it is evident that the only proper comparison of two engines can be on the basis of equal rates of work developed." I do not think that this is a fair statement of the case. That the boiler efficiency is a function of the rate of working is a well-known fact, but as my comparison was made on the assumption that the rate of working of the boilers, as measured by the rate of firing, was the same in all cases, there was no reason for bringing this fact into consideration. I estimated the economy in coal per indicated horse-power-hour on the basis of equal rates of firing, so that compared with the saturated steam engine the superheaters, with the same coal consumption, take advantage of their greater efficiency to develop more work. Mr. Vaughan prefers to restrict the power of the superheater to that developed by the saturated steam and to estimate the consequent saving in fuel. Either method is perfectly legitimate, and comparisons made in both ways, using Mr. Vaughan's own figures, are given below. The steam consumption per indicated horse-power-hour is assumed to be 23,8 lbs. for saturated steam, 20.9 lbs. for the moderate superheat and 16.7 lbs. for the high superheat. The amounts of heat in these quantities of steam are 27,900, 24,800 and 22,000 B.t.u. respectively, and these are in the ratio of 100 to 89 to 79. I understand that Mr. Vaughan agrees that these assumptions are reasonable. When the engines are developing equal amounts of work, the boiler efficiencies given by Mr. Vaughan are 60.0, 64.4 and 60.6 per cent. respectively, so that combining the engine and boiler efficiencies the respective coal consumptions are found to be 3.10, 2.57 and 2.44 lbs. per indicated horse-power-hour, or in the ratio of 100 to 83 to 78.5. In other words, the coal economy is 17 per cent. for the moderate superheat and 21.5 per cent. for the high superheat, a difference of less than 5 per cent. in favor of the latter. Now assume the rate of firing to be the same for all three engines. Mr. Vaughan's figures, as above, show the boiler efficiencies to be 60.0, 61.5 and 54.4 per cent. By combining these with the foregoing engine efficiencies the power developed by the three engines is found to be as 100 to 115 to 114.8, the coal consumption being 3.10, 2.69 and 2.70 lbs. per indicated horse-power-hour. Neither of these comparisons give the high superheat any marked superiority over the moderate superheat.

In conclusion I should like to point out that it is at least doubtful whether the St. Louis formula, used by Mr. Vaughan, can be applied directly to determine the change in boiler efficiency due to a reduction in the amount of heating surface, the grate and firebox remaining unchanged. Personally, I think that the formula as used gives too great a reduction in the boiler efficiency, but in the foregoing comparisons I have followed Mr. Vaughan's method without change, in order to show that his figures do not justify his criticism of my original conclusions.

Lawford H. Fry.

PROTECTIVE COATINGS FOR STRUCTURAL MATERIAL.

Pittsburgh, Pa., May 10, 1909.

To the Editor of the Railroad Age Gazette:

Referring to your interesting editorial under the above title in your issue of April 23:

The shop coating of a piece of iron or steel for the purpose of preventing rust prior to the final painting of the work deserves a good deal of attention and is important because it seems that iron or steel which has once started to oxidize or rust is very prone to continue the process and spread far from the original source of the trouble.

The subject is affected, as most problems of this kind are, very largely by the question of cost. Undoubtedly if more care were taken in rolling the steel to prevent excessive oxidation, which is of itself rust, or if a pickling process could be used just prior to the painting, much good would result, but unfortunately neither of these courses is practically open in the case of heavy structural work.

The designing of a coating to be used as a shop coating for the sole purpose of preventing rust between the time of

the manufacture of the steel and its erection and final painting requires considerable experience, both technical and practical, on the part of the designer of the coating, and certainly the concession by the user that sufficient money should be allowed for the purpose of enabling the designer to use the proper material and sufficient time should be given for the proper application of the material and the proper drying.

In looking over the materials or compounds which are applicable to this field for the purpose of choosing that which is best, there is in my mind no doubt as to the choice of the coating. This should be linseed oil, as in no other material have we to the same extent the ability to change within a reasonable time from a liquid to a solid material when exposed to the atmosphere and to grip or attach itself to metal with the greatest tenacity and, what is really the most important characteristic of all, being the best possible foundation for the final coat of paint.

While linseed oil is the best material that can be used for this purpose, it is not by any means perfect, because the modern linseed oil contains a much larger percentage of impurities than is generally supposed. These impurities being fatty and non-drying in their nature make the coat of oil when applied to the iron very weak and subject to abrasion. They also, on account of their solubility in water, allow easy access to water, which, when it is once under the very tender, weak coat, will very readily tear comparatively large openings in it, allowing the introduction of destructive agents; and where a real solution of the problem is wanted these impurities must be taken out of the oil in order that a perfectly soluble, inert film, fit not only for the temporary protection of the iron, but also fit to hold the future coats of paint, may be attained, and it is perhaps apt to say that there has been very much less attention paid to the removal of deleterious impurities from linseed oil than the subject deserves.

The perfectly pure refined linseed oil is of necessity too heavy in body to be perfectly applied for shop work, as its application would be too expensive and on account of the thickness of the coat its drying would be too slow, and when we consider that the object to be attained is the coating of the iron with an impervious film, the thickness of the film having little to do with the case, it is apparent that this is a position where thinners or solvents may be used with threefold advantage. The advantage would be that the thinner would lower the cost very largely, that it would give great ease of application either by dipping or hand-painting, and that it would materially add to the rapidity of drying, as the film could be regulated in thickness so as to allow maximum rapidity of drying; and I know from practical experience that the cost of such a coating, put into the best possible shape for the work for which it is to be used, can be made not to exceed 35 cents per gallon, which is very nearly, if not quite, as low as the usual price charged for the so-called paint oils which are frequently used for this purpose and which unfortunately are made more on the principle of selling than using and into which almost invariably rosin is introduced.

A shop coating for the prevention of rust must be preceded by the removal of any rust which may be present. In some cases this is best attained by scraping; in other cases a sand blast may be used very advantageously; but it is absolutely essential that the rust should be taken off from the metal before the application of the protective coating, and it is also essential that the work should be dry and free from grease, as either water or grease will thwart the purpose to be attained.

For work of this class there is no doubt in my mind but that the best drying results would be obtained by the use of an ordinary black oxide of manganese liquid dryer and that such a dryer can be used in this position with comparative liberality.

JAMES TODD.

Contributed Papers.

PERCENTAGE OF AIR-BRAKE CARS IN TRAINS.

The Interstate Commerce Commission is considering increasing from 75 to 90 per cent. the minimum percentage of cars in a train required to be air-braked. The General Managers' Association of Chicago has issued the following argument opposing the proposed change:

"At the hearing before the Interstate Commerce Commission at Washington on November 2, 1905, called for the purpose of having railways show cause why the minimum percentage of air-braked cars in trains as prescribed by law should not be increased, a number of railways appeared and presented arguments against an increase to 75 per cent. as proposed, the grounds being mainly the conditions and amount of business on hand at that time; the shortage of cars and the difficulty in procuring additional equipment; lack of terminal facilities, etc. These arguments were ineffective and, except the last one, not prevailing at the present time.

"So far as we have analyzed the reports of accidents on railways as issued by the Interstate Commerce Commission, we are unable to find any data that will show the increase of the minimum to 75 per cent. has resulted in additional safety by a reduction in the number of accidents. This is possibly due to the constant replacement of old equipment with new, improved types of car construction, all of which are equipped with air-brakes, thus raising the standard of safety and efficiency and also probably due to the fact that the averages on most roads were high enough before the order was issued that the general average was not greatly increased thereby.

"It is also the general opinion of railway officers that the increase has not resulted in any advantage so far as safety is concerned.

"On the other hand, there can be no doubt that the increased minimum has frequently resulted in detentions in train movement and embarrassments in operation that have resulted in serious losses to the railways for which there are no compensating advantages. It is the application of a strictly technical interpretation of the law to all conditions of train service that works an unnecessary hardship. The law recognizes no difference in conditions such as grades, speeds, density of traffic, character of the service whether passenger, freight or work, character of lading whether perishable or not, character and number of cars employed, their capacities and the other great variety of controlling factors that have influenced railway officers in regard to their equipment.

"If our information is correct that it is now proposed to raise the minimum to 90 per cent., most railways not operating with extreme conditions of grades, etc., over their entire lines will be most seriously embarrassed and, we believe, without adequate cause.

"The air-brakes on passenger trains receive great care, are tested many times each day, and frequently inspected, the railway being the most interested party, and it is believed that American railway practice in this respect cannot be improved upon by any legislative enactment with the present state of the art. Considering that the large majority of passenger trains have less than 10 cars, it will be seen that even the present minimum is an unwarranted burden, and any increase thereof cannot be defended as a general proposition.

"It is true that for exceptional high speed trains and on heavy grades and in crowded territory the highest brake efficiency is necessary and desirable and is, as a rule, furnished by the railway companies, but to say that the same exalted standard is required everywhere and on all trains regardless of service and conditions is not justified by past experience. Attention is called to the fact that the percentage of braking

power is higher on passenger cars than on freight, so that the aggregate braking effect is much higher per ton of weight of passenger trains. This is necessary on account of high speeds employed and greater number of lives involved. The movement of freight train cars under an increase of the present minimum will also be very seriously handicapped when considered as a general proposition. The American public has no conception of its indebtedness to the railways for their transportation facilities, with special reference to interchange of cars. For instance, a car is loaded in Maine and goes through to California, over a dozen lines possibly, each of which, by their agreement to the M. C. B. Rules of Interchange takes the same care of that car while on its lines as it does of its own equipment. This is an exhibition of good faith that has no parallel in other corporate interests. This gives shippers the advantage of unbroken movement without the loss of time, expense and the breakage due to transferring of lading. These cars must have air-brakes to be accepted in interchange. The brakes must be effective and are maintained while in transit by renewals of brake shoes and hose as they wear out or fail, the cylinders and triples are cleaned and oiled as per schedule. These cars are distributed all over this country, in Canada and Mexico, in all climates and temperatures wherever the necessities for the public has to be served by the railway companies. It is doubtless to the advantage of the railway, as that is their business, but not less so to the public who add the cost of transportation to their goods in their disposition. The public, therefore, is interested in transportation, and anything that hinders transportation affects the public. To apply a rigid standard of brake efficiency which might be necessary on a mountain road with heavy grades, curves and tunnels to prairie roads, branch lines, or even to many main lines, is as unnecessary as it would be to require that all railways should be built without grades.

"In order to accommodate traffic the railways have developed high-capacity cars and locomotives of increased weight and power and on low-grade roads the lengths of trains have been increased accordingly. The advantage of such movement would have to be sacrificed to a considerable extent with a higher minimum than at present, on account of slowness of operation on long trains. There is, of course, an advantage in having all cars connected with air in the train pipe to guard against break in two, but this function can be obtained without operative brakes at the rear end. These long trains are generally of empty cars, and a little calculation will show a fallacy in the necessity for a high minimum number of air-braked cars in such trains.

"Assume a train of 100 cars, total weight, say, 4,000,000 lbs., and the aggregate braking power of these cars will be 3,000,000 lbs. Now assume a train, gross weight as before, 4,000,000 lbs., but in fully loaded 50-ton cars, and we have but 26 cars with an aggregate braking power of 800,000 lbs., or 20 per cent. instead of 3,000,000 lbs. or 75 per cent. to control 4,000,000 lbs. of train.

"If, as has been amply demonstrated in practice on the heaviest grades in this country, freight trains can be perfectly controlled by a total air-brake capacity equal to one-fifth of the weight of the train, it is an absurdity to require nearly four times that much control under different conditions of lading, yet that is just what is required in placing a high minimum of operative brakes in all trains.

"All railways have more or less of cars of various classes, such as cook cars, bunk cars, and for various classes of work many of which remain in one place for months at a time. Air-brakes on such cars are used so little as to be useless, but under present rules such cars can only be hauled behind a certain proportion of air-braked cars involving unnecessary expense in view of the actual necessities in the movement and to fulfil a technical requirement that is an unnecessary burden.

"Owing to the widespread distribution of freight cars to every city and hamlet with frequent long waits between movements, during which times the air-brake packing leathers and lubrication suffers more from disuse tnan from service, is it at all surprising that a 100 or a 90 per cent. efficiency of freight cars is impossible to maintain? There must be a reasonable margin in order to move cars to where they can have care and attention. Let it be the aim of railways to have trains leaving terminals with the highest possible percentage of operative brakes, this percentage is bound to be lowered by the taking on of cars en route that have not had their turn of attention, which cannot be given until arrival at next terminal. Such has been the practice for years, successful and safe in relative terms. The change from 50 per cent. to 75 per cent. cut largely into the allowable margin for movement of non-air and inoperative air-brakes to division points, but if this margin is to be further reduced and, as has been shown, to fulfil a technical requirement only, no compensating advantages of safety having been shown, with a possible excess of brakes beyond the requirements for complete control, then we maintain that such practice is unmechanical, hinders economical movement of trains and imposes an unwarranted burden of expense in operation of railways without securing any additional safety or lessening of accidents, the only point sought to be gained."

ENGLISH RAILWAYS.

BY WILLIAM WICKHAM TURLAY.

II.

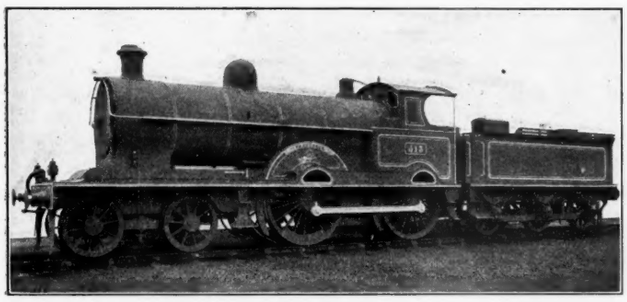
LOCOMOTIVES AND CARS.

One notices quite as many different types of locomotives in England as in America, but the English locomotives are usually very simple in appearance, the working parts often being out of sight, underneath the boiler, and the latter being jacketed and painted over, like the tender; drab and green are favorite colors, black being little used. They have very little polished metal about them, but are kept in excellent repair, well painted and scrupulously clean. The cabs are much smaller and less comfortable than those on American locomotives, but English weather is seldom extremely cold. Owing to the lines being so well protected, English locomotives have no bells or cowcatchers, no headlights, except small lanterns, and extremely small whistles, the latter being little used. Thanks to good design and construction, and careful handling, they work very quietly,and do not pour out clouds of black smoke as our American locomotives too generally do. The absence of noisy exhausts, smoke, whistling and bell ringing, adds much to the comfort of passengers and of residents along the lines of railways, and enables one to sleep undisturbed in the railway hotels which adjoin the stations in most of the larger cities. English locomotives are usually smaller than ours, the height and width being limited by the dimensions of tunnels and overhead bridges built many years ago, but they are powerful for their size, and as the cars are correspondingly light they are able to do their work easily and well. The engineers and firemen, as we would call them, or "drivers" and "stokers," as they are called there, deserve great credit for their skill and carefulness, which are especially naticeable in their use of soft coal without producing black smoke or cinders, and in the way they start and stop trains without shock or jolt.

English passenger cars, or "carriages," as they are called, are radically different from ours. They are lower and usually shorter, the bodies resting on underframes built of steel beams, carried on three separate pairs of wheels, or on two four-wheeled trucks. Internally they are divided cross-wise into a number of compartments, each entered by a side door, and accommodating from four to six passengers in the corridor cars, or from six to ten in the old style cars, on seats facing one another, the seating space allotted to each passenger vary-

ing somewhat, according to the class of his ticket, more space being given to first class passengers and less to second and third. The upholstery of the seats also differs for the several classes. The older cars have no passageways connecting the compartments, have no lavatories or steam heating apparatus, and are not vestibuled. While they answer very well for short distances, they are not as comfortable for long journeys as the "corridor cars," which have replaced them on long distance trains, and will soon replace them altogether except for suburban service.

The corridor cars are undoubtedly the highest development up to the present time in the way of cars for general passenger service and deserve careful study. They are connected by vestibules, are provided with lavatories, heated by steam, and have passageways or corridors running along one side from end to end, on to which the compartments open. These corridors reduce the seating capacity as compared with the old-style English cars, though they occupy little if any more space than the aisles of American cars, but the corridor cars combine all the good features of the older English cars and of the American cars without the defects of either. The compartments afford comparative privacy and freedom from the annoying and dangerous drafts produced in American cars when doors or windows are opened, as well as from jostling and confusion caused by people passing through the aisles. The numerous side doors allow passengers to enter or leave the train quickly and comfortably at stations, thus greatly reducing the length of stops. The corridors and vestibules allow access to any part of the train, while the compartments

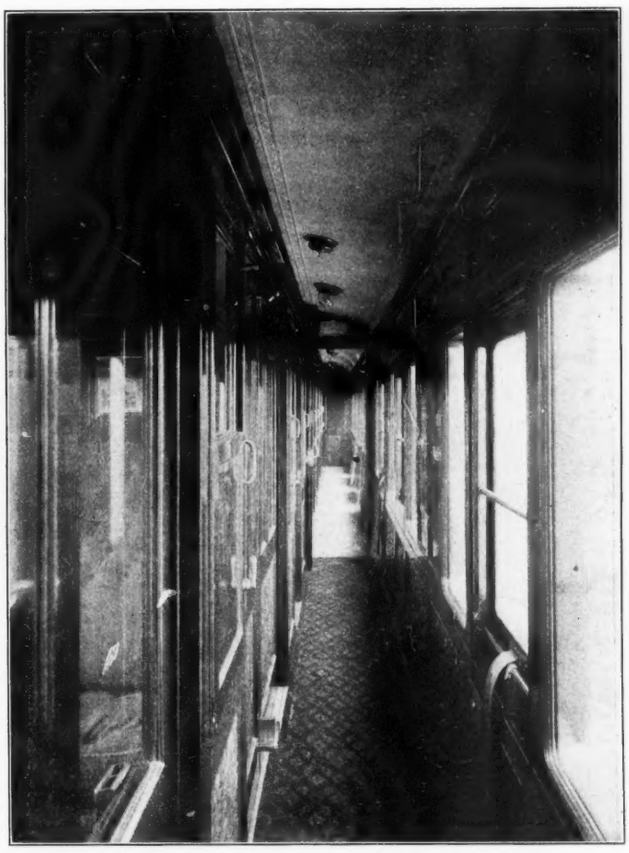


Typical British Passenger Locomotive.

are especially convenient and cozy for small parties of people traveling together. Owing in part to the subdivision of the cars and in part to the general avoidance of needless noise in operating one can speak in an ordinary tone of voice and be easily heard. In an American car with the passengers seated in pairs conversation is almost impossible except with one's seat-mate, while in the English compartment it is easy, and even a person traveling alone is likely to soon find himself engaged in conversation with one or more of his fellow passengers. The privacy, freedom from annoyance, and the comfortable grouping of people facing each other, seem to promote a sociable spirit, but anyone who prefers to avoid conversation is quickly allowed to do so. It is customary to reserve a certain number of compartments of each class for the exclusive use of women, and some for smokers. English dining and sleeping cars are usually provided with doors at the vestibules only, as in America, quick access to and from the station platforms not being necessary. The side doors used in the corridor cars make it impossible to build the bodies of the cars as strongly as could otherwise be done, and in case of collision or derailment there is greater danger to the passengers than in the stronger American cars. Until our railways are able to prevent such accidents to a greater degree than they have done heretofore this will probably be a good reason for not using side doors. They are not a necessary feature of corridor cars, but in connection with high platforms at stations they afford such convenience and save so much time and confusion that it is to be hoped they may be used in America whenever our standard of safety in operation of railways becomes high enough to warrant their general adoption. They are already used in cars built especially for suburban service on at least one American railway.

CLASS SYSTEM.

In theory there are no class distinctions on American railways, but in practice on all except accommodation trains we have Pullman cars and ordinary cars (also tourist cars in the West) and we sometimes find emigrants carried at a special low rate occupying the cars intended for the use of smokers, who have bought so-called "first-class" tickets. In England, as in Europe generally, class distinctions are frankly recognized and two or three classes of cars (in Germany four) are provided, aside from sleeping cars and special private cars, so that a traveler may within certain limits adjust his expenses to his taste or means. In England first class cars



Corridor of an English Vestibuled Car.

are relatively little used except by those whose social or official position makes it obligatory, or by people who are going on long journeys and desire the greater amount of space and the softer cushions. The first class car may thus be said to correspond to our Pullman parlor car. The second class cars are also little used, though more so probably than the first class, especially on suburban trains near the large cities, where many commuters use second class tickets. The vast majority of people travel third class, the cars of this class, except on suburban trains, usually being comfortably fitted and quite satisfactory. Several of the leading English railways have abolished the second class within recent years, retaining only the first and third classes and thus simplifying their service.

PASSENGER RATES.

The third class fare one way is almost invariably at the rate of one penny (two cents) per mile, the second class

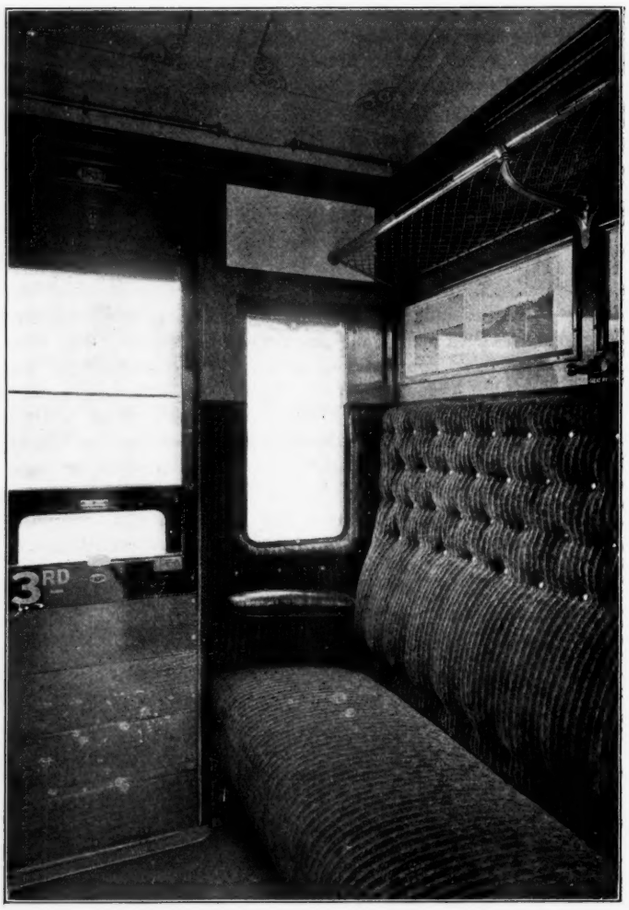
(when there is one) from 25 per cent. to 50 per cent above the third class, and the first class from 60 per cent to 100 per cent. above the third class. On roads which have abolished the second class the first class rate is usually lower than on those which still maintain three classes, possibly because of the economy in service caused by the simplification and a desire to attract enough first class passengers to make this portion of the service profitable. It will be seen that the English traveler who rides in a first-class car pays relatively more than the American who rides in the Pullman parlor car, as the latter in addition to buying a first class ticket pays an additional charge of only $2 to $2.50 for a journey of 8 to 12 hours duration (which may include a distance of 250 to 450 miles) and at a slightly higher rate for shorter distances.

Return or round-trip tickets are usually but not always sold at reduced rates and the commercial travelers through their organization, which is virtually a trade union, have secured the valuable privilege of buying round-trip tickets between their home towns and any other stations at the ordinary rate for a ticket in one direction only. These tickets are good for "the week-end" and are much used, as a commercial traveler can thus go home over Saturday and Sunday, even from a considerable distance, at less expense than if he remained at a hotel. Week-end tickets are sold to the general public to and from various popular resorts at reduced rates, usually 25 per cent. above the fare one way, and considerable travel is thus developed. Tickets can also be obtained at reduced rates

First Class Compartment, Looking Toward Corridor.

for "circular tours" to places of interest, these usually being issued jointly by two or more rail and steamer lines. Exceptionally low rates are often made for excursions by special trains which attract many people who are willing to be crowded and uncomfortable if they can travel cheaply. For example, on the occasion of a recent football game excursion trains were run from London to Bristol, 117½ miles, and return, a total distance of 235 miles, at a rate of four shillings and three pence* ($1.02), a trifle over 43/100 cents per mile. Special school, commutation and workmen's tickets are also issued as in America.

Although the commutation rates for suburban stations near London are very low receipts from this travel have fallen off greatly during recent years, in spite of the increase of



Interior of Third Class Carriage.

population. Officers of the railways most injured by the change think that private motor cars are now carrying many of their former first class commuters and new lines of motor omnibuses and street railway cars are carrying the second and third class passengers.

(To be continued.)

GOVERNMENT REPORT OF BLOCK SIGNAL MILEAGE.

The tables shown in the following five pages are copied from a bulletin just issued by the Interstate Commerce Commission giving the statistics as of January 1, 1909. These are in substantially the same shape as those published one year ago and reprinted in the *Railroad Gazette*, April 17, 1908.

The total length of road in the United States here shown as being operated under the block system on January 1, 1909, was 59,548.7 miles. Of this mileage 12,190.6 was automatic and 47,358.1 was manual. There was an increase of 1,387.6 miles in the length of road covered by automatic block signals over that shown in the report of January 1, 1908, while the manual mileage has decreased 517.6 miles. The net increase of block signal mileage in the United States during the year was 870 miles.

Figures for this same date—January 1, 1909—were pub-

*As a matter of convenience, the value of the English shilling has been taken as 24 cents and that of the penny as 2 cents, though the actual value of the shilling is more nearly 24¼ cents and that of the penny $2^{1}/_{48}$ cents.

lished in a table given in the *Railroad Age Gazette* December 25 last, page 1638. A comparison of that table with Table No. 1 now printed shows differences in many items and in the totals. The Grand Trunk appears to have given us an erroneous report this year, and last year both the Government table and our own had it wrong. The Minneapolis, St. Paul & Sault Ste. Marie appears in the Government table this year for the first time. Other differences are due to the fact that for a half-dozen roads, indicated in our table by daggers, we were unable to get corrected figures in season for our December issue. The Pennsylvania reports a considerable increase in manual. Still other differences are unexplainable, and we can only say that our information was official, from the managers of the companies. The Government's information also is official, of course. The more detailed requirements of the Interstate Commerce Commission probably led to more careful compilations by some of the companies.

It will be seen that telephones are used for manual block signals on 2,357 miles more road than one year ago. They are now used extensively on the Atchison, the North Western, the Burlington, the St. Paul, the Northern Pacific, the Pennsylvania and the St. Louis & San Francisco. The Illinois Central, which a year ago reported 769 miles of single-track line worked by controlled manual block signals with telephones (telephones as auxiliary, apparently), now reports only 5 miles of manual block signaling—business so slack that the danger of collision no longer troubles them!

The Commissioner's bulletin contains the following—

NOTES ON THE TABLES.

Atlantic Coast Line: Block system discontinued on 108.2 miles single-track road.

Boston & Maine: Increase of 157.8 miles automatic; decrease of 90.6 miles manual.

Chicago & Northwestern: Manual installed on 143.7 miles and discontinued on 211.4 miles of road.

Missouri Pacific: Manual discontinued on 221.7 miles; staff system installed on 4 miles of road.

Northern Pacific: Manual installed on 248.5 miles and discontinued on 80.9 miles.

Oregon Railroad & Navigation Company: Automatic installed on 109.5 miles.

Oregon Short Line: Automatic installed on 157.1 miles.

Pennsylvania: Increase of 246.5 miles manual and 1 mile automatic. Discontinued, manual 8.6 miles.

Philadelphia, Baltimore & Washington: Manual installed on 85.2 miles.

Southern Pacific, Pacific System: Automatic installed on 144.6 miles and manual discontinued on 6.9 miles.

The present compilation includes a number of roads not shown in the report of January 1, 1908, notably the Chicago, Milwaukee & Puget Sound and the Minneapolis, St. Paul & Sault Ste. Marie, both of which now have the manual block system throughout. During the past year a few small roads have discontinued the block system altogether.

Automatic block signals are in use on the following roads not reporting to the Commission:

Boston Elevated, 9 miles; Interborough Rapid Transit (New York City), 13.5 miles; Philadelphia & Western, 11.5 miles; Philadelphia Rapid Transit, 5 miles.

It will be noted in Table 1 that the total block signal mileage of the Chicago, Burlington & Quincy, the Lake Shore & Michigan Southern and the Lehigh Valley roads exceeds the total mileage of passenger lines operated. In the case of the Chicago, Burlington & Quincy this is due to the fact that on 715.2 miles of that road, on which but one engine is regularly in service, manual block rules become effective whenever more than one engine is employed. The column showing the total miles operated does not include lines on which only one engine is in service. This condition also exists on some portions of the branch lines of the Lehigh Valley; and this road in addition has portions of its lines which are used exclusively for freight traffic worked by the block system. The Lake Shore & Michigan Southern also has 74.9 miles of road covered by the block system on which no regular passenger trains are operated.

On the Atlantic Coast Line 34 stations are closed eight months of the year, and on the Long Island 6 stations are closed six months.

Table 1.

Boston & Maine: The single-track items include 21.7 miles of double-track road, the westbound track being worked by manual signals and the eastbound track being equipped with automatic signals.

Chicago, Burlington & Quincy: The figures include 715.2 miles of road on which only one engine is regularly in service, which mileage is not included under the total miles of passenger lines operated.

Erie & Jersey; Newburgh & South Shore: These are freight lines.

Illinois Central: Figures include some road of more than four tracks.

Lehigh Valley; Lake Shore & Michigan Southern; Philadelphia & Reading; Galveston, Harrisburg & San Antonio; Union: These figures include some mileage over which passenger trains are not regularly operated.

Pennsylvania; Washington Terminal: Figures include some road of more than four tracks.

Table 2.

Atchison, Topeka & Santa Fe: In addition to mileage shown there are electric motor automatic signals on 78.5 miles of road worked by the manual block system.

Chicago & Eastern Illinois: In addition to mileage shown there are inclosed disk signals on 8.7 miles of road worked by the manual block system.

Boston & Albany: In addition to signals shown in this table there are 9.1 miles of electric slot signals.

Michigan Central: In addition to signals shown in this table there are 5.3 miles covered by electric slot signals.

New York Central & Hudson River: In addition to signals shown in this table there are 2 miles of road (four-track) in tunnel where "light signals" are used.

Table 3.

Bessemer & Lake Erie: The figures here shown include 8.9 miles of single track used exclusively by freight trains, not included in Table No. 1.

Chicago & Eastern Illinois: The figures here shown include 5.8 miles of single track used exclusively by freight trains, not included in Table No. 1.

Pennsylvania: These figures include 2.4 miles of three-track road, of which two tracks are worked by telegraph block system and one track by controlled manual.

Northeast Pennsylvania: Staff system on this road is used only four months of the year.

NEW WORK.

The reports of the railway companies to the Commission indicate that the following installations of the block system are contemplated during 1909:

Baltimore & Ohio Southwestern: To cover entire line with manual, an addition of 921.6 miles.

Chicago, Burlington & Quincy: 468.3 miles double-track automatic and substitute controlled manual for manual on 1,419.2 miles.

Cincinnati, Hamilton & Dayton: 7.3 miles double-track automatic.

Grand Rapids & Indiana: 55.8 miles single-track manual.

Long Island: 7.1 miles double-track and 3.3 miles three-track automatic.

Newburgh & South Shore: 3.1 miles double-track manual.

New York, Ontario & Western: 11.7 miles single-track automatic.

Southern Pacific: 168 miles single-track automatic.

St. Louis & San Francisco: 364.9 miles single-track and 20.6 miles double-track automatic.

TABLE 1.—AGGREGATE LENGTH OF LINES ON WHICH THE BLOCK SYSTEM WAS IN USE, JANUARY 1, 1909.

Names of railroads.	Automatic block signals.					Nonautomatic block signals.					Total, automatic and non-automatic.	Total miles operated (passenger lines).	Per cent operated under block system.
	Single track.	Double track.	Three track.	Four track.	Total.	Single track.	Double track.	Three track.	Four track.	Total.			
Atchison, Topeka & Santa Fe	39.4	39.5			78.9	1,042.7	414.4			1,457.1	1,536.0	5,376.7	28.6
Coast Lines	7.4	1.0			8.4	4.3				4.3	12.7	1,908.1	.7
Gulf, Colorado & Santa Fe	8.3				8.3	2.1				2.1	10.4	1,411.2	.7
Atlanta & West Point							6.0			6.0	6.0	225.0	2.2
Atlantic Coast Line						407.6	87.9			495.5	495.5	3,745.8	13.2
Baltimore & Ohio	11.4	161.9			173.3	209.7	576.5	82.5	18.8	887.5	1,060.8	3,083.0	34.4
Baltimore & Ohio Southwestern						8.7	48.5		2.2	59.4	59.4	981.0	6.0
Baltimore & Sparrow's Point							3.0			3.0	3.0	4.7	63.8
Bessemer & Lake Erie						95.1	91.0			186.1	186.1	188.3	98.8
Boston & Maine	26.7	307.0	0.5	2.1	336.3	21.7	11.3			33.0	369.3	2,238.6	16.5
Boston, Revere Beach & Lynn		13.8			13.8						13.8	13.8	100.0
Buffalo, Rochester & Pittsburg						298.6	123.3			421.9	421.9	421.9	100.0
Butte, Anaconda & Pacific	7.9				7.9						7.9	25.7	30.7
Caldwell & Northern						2.4				2.4	2.4	23.4	10.3
Central of Georgia						52.3	7.4			59.7	59.7	1,915.9	3.1
Central of New Jersey	13.0	165.5	2.4	31.5	212.4						212.4	475.8	44.6
Central Vermont						1.5				1.5	1.5	403.3	.4
Chesapeake & Ohio		11.1			11.1	1,193.7	278.2			1,471.9	1,483.0	1,507.3	98.4
Coal River						51.3				51.3	51.3	51.3	100.0
Chicago & Alton	171.3	141.1			312.4	351.9	37.9			389.8	702.2	998.9	70.3
Chicago & Eastern Illinois		98.4			98.4	163.6	57.5			221.1	319.5	693.0	46.1
Chicago & Northwestern		591.2	12.5	2.4	606.1	2,287.2	228.5			2,515.7	3,121.8	7,706.8	40.5
Chicago & Western Indiana		17.8			17.8		6.3	3.2		9.5	27.3	27.3	100.0
Chicago, Burlington & Quincy		25.0		3.1	28.1	8,151.6	502.6	19.1	1.4	8,674.7	8,702.8	8,218.4	100.0
Chicago Great Western		7.9			7.9	264.2	26.8			291.0	298.9	735.0	40.7
Chicago, Milwaukee & St. Paul	5.9	42.6			48.5	3,488.7	385.4			3,874.1	3,922.6	6,550.2	60.0
Chicago, Milwaukee & Puget Sound						622.7				622.7	622.7	622.7	100.0
Montana						92.9				92.9	92.9	153.3	60.6
Chicago, Peoria & St. Louis Ry. of Illinois	1.3				1.3						1.3	235.3	.6
Chicago, Rock Island & Pacific	55.9	208.5			264.4	356.9	61.8			418.7	683.1	7,101.3	9.6
Chicago, St. Paul, Minneapolis & Omaha		6.4			6.4	591.6	64.1			655.7	662.1	1,486.5	44.5
Chicago Terminal Transfer		5.4			5.4						5.4	45.8	11.8
Cincinnati & Muskingum Valley						11.4				11.4	11.4	148.4	7.7
Cincinnati, Hamilton & Dayton						73.0	27.9			100.9	100.9	907.0	11.0
Cleveland, Akron & Columbus						126.5	15.6			142.1	142.1	177.8	79.9
Colorado Midland						2.5				2.5	2.5	331.0	.1
Cornwall & Lebanon						8.3	13.7			22.0	22.0	22.0	100.0
Cumberland & Pennsylvania						4.3		3.0		7.3	7.3	31.3	23.3
Cumberland Valley		6.7			6.7	16.6				16.6	23.3	163.2	14.3
Davenport, Rock Island & Northwestern						40.6	1.1			41.7	41.7	41.7	100.0
Delaware & Hudson	177.2	208.6	4.3	17.5	407.6	.6				.6	408.2	743.9	54.8
Delaware, Lackawanna & Western	14.7	464.6	5.9		485.2	1.6				1.6	486.8	778.2	61.3
Syracuse, Binghampton & New York		9.8			9.8						9.8	81.0	12.1
Duluth & Iron Range						14.8	2.0			16.8	16.8	168.0	10.0
Duluth, South Shore & Atlantic						4.2				4.2	4.2	593.4	.7
Durham & Southern						56.0				56.0	56.0	56.0	100.0
Erie		62.0		13.6	75.6	643.5	618.9			1,262.4	1,338.0	1,744.6	76.7
Chicago & Erie						240.4	8.4			248.8	248.8	248.8	100.0
Columbus & Erie						12.6	9.8			22.4	22.4	22.4	100.0
Erie & Jersey		42.3			42.3						42.3		
New Jersey & New York		10.5			10.5	26.1				26.1	36.6	51.8	70.7
New York, Susquehanna & Western and Wilkes-Barre & Eastern						20.7				20.7	20.7	208.4	9.9
Grand Rapids & Indiana							2.2			2.2	2.2	436.5	.5
Grand Trunk System: St. Clair Tunnel	1.1	1.6			2.7						2.7	2.7	100.0
Great Northern	8.2	62.0			70.2	259.7				259.7	329.9	6,893.8	4.7
Hocking Valley						74.7				74.7	74.7	337.0	22.2
Illinois Central	30.6	234.4		12.0	277.0		5.0			5.0	282.0	4,273.1	6.6
Yazoo & Mississippi Valley	6.6				6.6						6.6	1,191.7	.6
Iowa Central						11.0				11.0	11.0	502.3	.2
Kansas City, Clinton & Springfield						8.4				8.4	8.4	155.0	5.4
Kentucky & Indiana Bridge & R. R. Co.						7.2	2.7	.7		10.6	10.6	10.6	100.0
Lackawanna & Wyoming Valley						1.0	2.4			3.4	3.4	22.6	15.0
Lehigh Valley	14.1	421.0	34.6	11.1	480.8	691.3	50.5			741.8	1,222.6	1,144.8	100.0
Long Island	4.0	73.6		3.7	81.3		22.7			22.7	104.0	392.0	26.5
Louisville & Nashville	25.2	10.3			35.5	91.2	43.9			135.1	170.6	3,775.0	4.5
Maine Central	146.4	44.7			191.1						191.1	910.6	20.9
Marquette & Southeastern						3.7				3.7	3.7	50.8	7.3
Minneapolis, St. Paul & Sault Ste. Marie						1,992.1				1,992.1	1,992.1	1,992.1	100.0
Missouri, Kansas & Texas	2.0				2.0						2.0	3,043.0	
Missouri Pacific	43.5	17.2			60.7	27.1				27.1	87.8	3,194.7	2.8
St. Louis, Iron Mountain & Southern	83.1	8.7			91.8	6.3	1.1			7.4	99.2	2,505.6	4.8
Mobile & Ohio		4.7			4.7	42.4				42.4	47.1	825.0	9.6
Monongahela	.5				.5						.5	57.6	.9
Monongahela Connecting							4.0			4.0	4.0	55.0	8.0
Nashville, Chattanooga & St. Louis						89.8	5.4			95.2	95.2	1,236.5	7.7
Newburgh & South Shore						3.1	2.1			5.2	5.2		
New York & Long Branch		38.0			38.0						38.0	38.0	100.0
New York Central Lines:													
Boston & Albany		180.0	0.4	17.0	197.4		3.5		3.1	6.6	204.0	359.3	56.9
Chicago, Indiana & Southern		2.0			2.0	17.4				17.4	19.4	303.2	6.4
Cleveland, Cincinnati, Chicago & St. Louis						541.3	325.8			867.1	867.1	1,762.7	49.2
Lake Erie & Western						9.7	8.9			18.6	18.6	719.0	24.5
Lake Shore & Michigan Southern	6.9	325.6	64.7	121.2	518.4	969.6	23.1			992.7	1,511.1	1,446.2	100.0
Dunkirk, Allegheny Valley & Pittsburg						90.3				90.3	90.3	90.3	100.0
Lake Erie, Alliance & Wheeling						87.7				87.7	87.7	87.7	100.0
Michigan Central		271.9			271.9	901.1	19.1			920.2	1,192.1	1,192.1	100.0
New York Central & Hudson River		129.4		16.5	145.9	1,708.4	650.0	25.1	303.8	2,687.3	2,833.2	2,846.2	99.2
Peoria & Eastern						3.6	1.7			5.3	5.3	337.9	1.3
Pittsburg & Lake Erie		105.3	8.3	33.5	147.1	21.5	2.9			24.4	171.5	183.9	93.8
New York, New Haven & Hartford	20.5	235.8			256.3	258.0	208.4		75.8	542.2	798.5	1,968.0	40.6
New York, Ontario & Western	27.3	109.7			137.0						137.0	492.8	27.8
Norfolk & Western	3.0	64.0			67.0	1,470.8	186.3			1,657.1	1,724.1	1,921.1	89.7
Northern Pacific	1.7	17.7			19.4	1,016.1	263.4			1,279.5	1,298.9	4,731.9	27.4
Northwestern Pacific	.6	9.4			10.0						10.0	327.2	3.0
Pennsylvania		56.2	3.0	185.3	244.5	1,253.2	731.4	35.4	192.4	2,212.4	2,456.9	3,296.4	71.1
Northern Central						287.0	126.4		19.5	432.9	432.9	439.5	96.2
Pennsylvania Company	18.3	79.0	18.9	35.3	151.5	217.1	491.8	4.2	4.5	717.6	869.1	1,312.3	66.2
Philadelphia, Baltimore & Washington		11.4		21.0	32.4	107.1	150.2	17.1	14.6	289.0	321.4	637.8	50.4
Pittsburg, Cincinnati, Chicago & St. Louis		7.2		2.1	9.3	610.5	407.0	58.9	17.8	1,094.2	1,103.5	1,416.6	77.9
West Jersey & Seashore		89.1	4.5		93.6	51.4	29.0			80.4	174.0	291.2	60.0
Peoria & Pekin Union							6.0			6.0	6.0	15.4	38.9
Pere Marquette	12.9				12.9	19.0				19.0	31.9	1,537.0	2.1
Philadelphia & Reading	14.8	290.9	41.1	15.8	362.6	155.2	124.8			280.0	642.6	851.5	73.5
Atlantic City		87.0			87.0	22.3				22.3	109.3	163.9	66.7
Northeast Pennsylvania	2.9	1.9			4.8	1.7				1.7	6.5	25.6	25.4
Perkiomen						38.3				38.3	38.3	38.3	100.0
Philadelphia, Newton & New York	4.2	1.6	1.8		7.6						7.6	21.8	34.9
Reading & Columbia						35.7				35.7	35.7	53.3	67.0

(Continued on next page.)

TABLE 1.—(*Continued*).

Names of railroads.	Automatic block signals.					Nonautomatic block signals.					Total, automatic and non-automatic.	Total miles operated (passenger lines).	Per cent operated under block system.
	Single track.	Double track.	Three track.	Four track.	Total.	Single track.	Double track.	Three track.	Four track.	Total.			
Queen & Crescent Route:													
Alabama Great Southern	73.5				73.5						73.5	290.5	25.3
Cincinnati, New Orleans & Texas Pacific	266.3	68.0			334.3	.9				.9	335.2	335.9	99.8
Richmond, Fredericksburg & Potomac						9.8	77.9			87.7	87.7	87.7	100.0
St. Joseph & Grand Island						.3				.3	.3	251.6	.1
St. Louis & San Francisco	25.3	16.2			41.5	370.4	20.6			391.0	432.5	4,726.6	9.2
St. Louis Merchants Bridge Terminal		5.7			5.7		1.1			1.1	6.8	9.9	68.6
St. Louis Southwestern	.4				.4						.4	621.5	
San Pedro, Los Angeles & Salt Lake	1.1				1.1						1.1	1,066.4	.1
Seaboard Air Line						213.5				213.5	213.5	2,436.5	8.8
Southern		3.0			3.0	1,403.9	194.7			1,598.6	1,601.6	6,092.3	26.2
St. Louis—Louisville Lines						68.4				68.4	68.4	526.2	13.1
Southern Illinois & Missouri Bridge		4.6			4.6						4.6	4.6	100.0
Southern Pacific, Atlantic System:													
Galveston, Harrisburg & San Antonio	90.0				90.0						90.0	1,270.6	7.1
Louisiana Western	103.6				103.6						103.6	140.3	73.8
Morgan's Louisiana & Texas	95.3				95.3						95.3	242.0	39.4
Texas & New Orleans	108.2				108.2						108.2	438.5	24.7
Southern Pacific, Pacific System	1,765.2	131.4		1.0	1,897.6	95.4				95.4	1,993.0	5,966.4	33.4
Staten Island Rapid Transit		10.1			10.1						10.1	10.9	92.6
Terminal Railroad Association of St. Louis		6.0			6.0		1.1			1.1	7.1	12.6	56.3
Ulster & Delaware	24.4				24.4						24.4	129.3	18.8
Union		.6			.6	1.4				1.4	2.0	7.4	8.1
Union Pacific	804.3	415.5		2.2	1,222.0	11.1				11.1	1,233.1	3,134.4	39.3
Oregon R. R. & Navigation Co	415.7				415.7						415.7	1,309.1	31.7
Oregon Short Line	333.9				333.9						333.9	1,306.5	25.6
Vandalia						201.6	36.3			237.9	237.9	828.2	29.9
Virginian						2.2				2.2	2.2	359.1	.6
Wabash		7.2			7.2	1,726.7	94.0			1,820.7	1,827.9	1,954.9	93.5
Wabash Pittsburg Terminal		3.5			3.5						3.5	63.5	5.5
Washington Southern						32.1				32.1	32.1	32.1	100.0
Washington Terminal		1.1		1.0	2.1						2.1	2.1	100.0
Wisconsin Central							4.4			4.4	4.4	783.2	.5
Total	5,126.0	6,312.8	202.9	548.9	12,190.6	38,407.4	8,047.6	249.2	653.9	47,358.1	59,548.7	161,451.1	

TABLE 2.—KINDS OF AUTOMATIC SIGNALS IN USE.

Names of railroads.	Exposed disk.		Inclosed disk.		Semaphores.						Normal clear, miles of track.	Normal danger, miles of track.	Total automatic signals.		
					Electro-pneumatic.		Electric motor.		Electro-gas.				Miles of road.	Miles of track.	Number of block sections.
	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.					
Atchison, Topeka & Santa Fe			13.3	26.6			65.6	118.0			144.6		78.9	144.6	79
Coast lines			6.4	7.4			2.0	2.0			9.4		8.4	9.4	9
Gulf, Colorado & Santa Fe			8.3	8.3							8.3		8.3	8.3	6
Baltimore & Ohio			8.7	8.7			71.3	139.9	93.3	186.6		335.2	173.3	335.2	370
Boston & Maine			1.3	3.1			326.1	629.7	8.9	17.8	631.2	19.4	336.3	650.6	843
Boston, Revere Beach & Lynn							13.8	27.6			27.6		13.8	27.6	59
Butte, Anaconda & Pacific			7.9	7.9							7.9		7.9	7.9	7
Central of New Jersey					29.7	116.0	163.3	323.2	19.4	38.0	439.2	38.0	212.4	477.2	741
Chesapeake & Ohio							11.1	22.2			22.2		11.1	22.2	9
Chicago & Alton							312.4	453.5			136.8	316.7	312.4	453.5	293
Chicago & Eastern Illinois							98.4	196.8			196.8		98.4	196.8	165
Chicago & Northwestern			599.8	1,216.9	6.3	12.6					1,229.5		606.1	1,229.5	513
Chicago & Western Indiana							17.8	35.6			35.6		17.8	35.6	59
Chicago, Burlington & Quincy			23.0	46.0	5.1	16.4					62.4		28.1	62.4	65
Chicago Great Western							7.9	15.8			15.8		7.9	15.8	20
Chicago, Milwaukee & St. Paul			2.4	2.4			42.6	85.2	3.5	3.5	85.2	5.9	48.5	91.1	102
Chicago, Peoria & St. Louis Ry. of Illinois							1.3	1.3			1.3		1.3	1.3	1
Chicago, Rock Island & Pacific			6.3	12.6			258.1	460.3			472.9		264.4	472.9	439
Chicago, St. Paul, Minneapolis & Omaha							6.4	12.8			12.8		6.4	12.8	6
Chicago Terminal Transfer			1.0	2.0	3.2	6.4	1.2	2.4			10.8		5.4	10.8	10
Cumberland Valley							6.7	13.4			13.4		6.7	13.4	7
Delaware & Hudson			37.8	75.6					369.8	601.7		677.3	407.6	677.3	773
Delaware Lackawanna & Western			15.9	31.8			469.3	929.8			961.6		485.2	961.6	1,301
Syracuse, Binghamton & New York			9.8	19.6							19.6		9.8	19.6	22
Erie							75.6	178.4			4.0	174.4	75.6	178.4	97
Erie & Jersey							42.3	84.6			84.6		42.3	84.6	44
New Jersey & New York							10.5	21.0				21.0	10.5	21.0	11
Grand Trunk System: St. Clair Tunnel					2.7	4.3						4.3	2.7	4.3	3
Great Northern							70.2	132.2			128.0	4.2	70.2	132.2	138
Illinois Central			27.7	102.4			83.4	152.2	165.9	329.8	83.7	500.7	277.0	584.4	489
Yazoo & Mississippi Valley							6.6	6.6			6.6		6.6	6.6	8
Lehigh Valley			259.8	544.2			206.5	431.1	14.5	29.0		1,004.3	480.8	1,004.3	1,073
Long Island							81.3	166.0			162.0	4.0	81.3	166.0	265
Louisville & Nashville							35.5	45.8			45.8		35.5	45.8	74
Maine Central							191.1	235.8			235.8		191.1	235.8	209
Missouri, Kansas & Texas			.5	.5			1.5	1.5			2.0		2.0	2.0	3
Missouri Pacific							60.7	77.9			77.9		60.7	77.9	38
St. Louis, Iron Mountain & Southern							91.8	100.5			100.5		91.8	100.5	60
Mobile & Ohio							4.7	9.5			9.5		4.7	9.5	3
Monongahela							.5	.5			.5		.5	.5	1
New York & Long Branch							38.0	76.0			76.0		38.0	76.0	98
New York Central Lines:															
Boston & Albany	76.1	155.4	8.6	33.0			97.5	207.0	6.1	12.2	286.6	121.0	188.3	407.6	476
Chicago, Indiana & Southern							2.0	4.0			4.0		2.0	4.0	6
Lake Shore & Michigan Southern			5.3	5.3			335.7	741.2	177.4	590.5	742.1	594.9	518.4	1,337.0	544
Michigan Central			81.1	162.2			185.5	371.0			533.2		266.6	533.2	356
New York Central & Hudson River			11.2	22.4			124.7	278.4	8.1	16.2	317.0		144.0	317.0	553
Pittsburg & Lake Erie							147.1	369.5			369.5		147.1	369.5	206
New York, New Haven & Hartford	170.9	322.9	63.1	126.2			22.3	43.0			492.1		256.3	492.1	270
New York, Ontario & Western	76.3	130.3					60.7	116.4			246.7		137.0	246.7	135
Norfolk & Western							67.0	131.0			131.0		67.0	131.0	67
Northern Pacific			3.0	4.5			12.6	25.0	3.8	7.6	37.1		19.4	37.1	42
Northwestern Pacific							10.0	19.4			19.4		10.0	19.4	30

(Continued on next page.)

TABLE 2.—(*Continued*).

Names of railroads.	Exposed disk.		Inclosed disk.		Semaphores.						Normal clear, miles of track.	Normal danger, miles of track.	Total automatic signals.		
					Electro-pneumatic.		Electric motor.		Electro-gas.						
	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.			Miles of road.	Miles of track.	Number of block sections.
Pennsylvania	.....	.....	5.0	10.0	228.4	836.7	11.1	22.2	.....	.....	868.9	.....	244.5	868.9	1,460
Pennsylvania Company	.....	.....	.....	.....	.....	.....	151.5	374.2	.....	.....	374.2	.....	151.5	374.2	192
Philadelphia, Baltimore & Washington	.....	.....	.....	.....	32.4	106.8	.....	.....	.....	.....	106.8	.....	32.4	106.8	155
Pittsburg, Cincinnati, Chicago & St. Louis	.....	.....	.....	.....	.....	.....	9.3	22.8	.....	.....	22.8	.....	9.3	22.8	21
West Jersey and Seashore	.....	.....	.....	.....	93.6	191.7	.....	.....	.....	.....	191.7	.....	93.6	191.7	249
Pere Marquette	.....	.....	10.0	10.0	.....	.....	2.9	2.9	.....	.....	12.9	.....	12.9	12.9	9
Philadelphia & Reading	.....	.....	347.2	760.2	1.2	2.4	.....	.....	14.2	20.5	2.4	780.7	362.6	783.1	874
Atlantic City	.....	.....	87.0	174.0	.....	.....	.....	.....	.....	.....	.....	174.0	87.0	174.0	90
Northeast Pennsylvania	.....	.....	4.8	6.7	.....	.....	.....	.....	.....	.....	6.7	.....	4.8	6.7	8
Philadelphia, Newton & New York	.....	.....	7.6	12.8	.....	.....	.....	.....	.....	.....	.....	12.8	7.6	12.8	15
Queen & Crescent Route:															
Alabama Great Southern	29.0	29.0	9.0	9.0	.....	.....	35.5	35.5	.....	.....	73.5	.....	73.5	73.5	48
Cincinnati, New Orleans & Texas Pacific	39.0	39.0	55.9	55.9	.....	.....	234.4	299.4	5.0	8.0	357.3	45.0	334.3	402.3	323
St. Louis & San Francisco	.....	.....	8.0	11.0	.....	.....	33.5	46.7	.....	.....	50.7	7.0	41.5	57.7	53
St. Louis Merchant's Bridge Terminal	.....	.....	.....	.....	.....	.....	5.7	11.4	.....	.....	11.4	.....	5.7	11.4	28
St. Louis Southwestern	.....	.....	.....	.....	.....	.....	.4	.4	.....	.....	.4	.....	.4	.4	1
San Pedro, Los Angeles & Salt Lake	.....	.....	.....	.....	.....	.....	1.1	1.1	.....	.....	1.1	.....	1.1	1.1	1
Southern	.....	.....	.....	.....	.....	.....	3.0	6.0	.....	.....	6.0	.....	3.0	6.0	9
Southern Illinois & Missouri Bridge	.....	.....	.....	.....	.....	.....	4.6	9.2	.....	.....	9.2	.....	4.6	9.2	18
Southern Pacific, Atlantic System:															
Galveston, Harrisburg & San Antonio	.....	.....	0.9	0.9	.....	.....	89.1	89.1	.....	.....	90.0	.....	90.0	90.0	76
Louisiana Western	.....	.....	.....	.....	.....	.....	103.6	103.6	.....	.....	103.6	.....	103.6	103.6	73
Morgan's Louisiana & Texas	.....	.....	.....	.....	.....	.....	95.3	95.3	.....	.....	95.3	.....	95.3	95.3	72
Texas & New Orleans	.....	.....	.....	.....	.....	.....	108.2	108.2	.....	.....	108.2	.....	108.2	108.2	75
Southern Pacific, Pacific System	.....	.....	1.0	1.0	6.0	14.0	1,890.6	2,017.0	.....	.....	2,032.0	.....	1,897.6	2,032.0	1,696
Staten Island Rapid Transit	.....	.....	10.1	20.2	.....	.....	.....	.....	.....	.....	.....	20.2	10.1	20.2	49
Terminal R. R. Assn. of St. Louis	.....	.....	.....	.....	.....	.....	6.0	12.0	.....	.....	12.0	.....	6.0	12.0	16
Ulster & Delaware	.....	.....	.....	.....	.....	.....	24.4	24.4	.....	.....	24.4	.....	24.4	24.4	20
Union	0.6	1.2	.....	.....	.....	.....	.....	.....	.....	.....	1.2	.....	.6	1.2	1
Union Pacific	.....	.....	10.4	20.8	.....	.....	1,176.3	1,546.1	35.3	70.6	1,637.5	.....	1,222.0	1,637.5	1,239
Oregon R. R. & Navigation Co.	.....	.....	.....	.....	.....	.....	415.7	415.7	.....	.....	415.7	.....	415.7	415.7	282
Oregon Short Line	.....	.....	22.3	22.3	.....	.....	311.6	311.6	.....	.....	333.9	.....	333.9	333.9	211
Wabash	.....	.....	.....	.....	.....	.....	7.2	14.4	.....	.....	14.4	.....	7.2	14.4	25
Wabash Pittsburg Terminal	.....	.....	.....	.....	.....	.....	3.5	7.0	.....	.....	7.0	.....	3.5	7.0	5
Washington Terminal	.....	.....	.....	.....	2.1	18.2	.....	.....	.....	.....	.....	18.2	2.1	18.2	13
Total	391.9	677.8	1,781.4	3,584.4	410.7	1,325.5	8,665.1	13,071.2	925.2	1,932.0	15,711.7	4,879.2	12,174.3	20,590.9	18,605

TABLE 3.—METHODS AND APPARATUS USED WITH MANUAL BLOCK SYSTEM.

Names of railroads.	Morse telegraph.		Telephone.		Electric bells.		Controlled manual.						Electric train staff.		Block signal stations.	
							No track circuit.		Track circuit at stations.		Continuous track circuit.					
	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Total number.	Number closed part time.
Atchison, Topeka & Santa Fe	.....	.....	1,418.8	1,812.6	.....	.....	.....	.....	.....	.....	.....	.....	38.3	58.9	291	94
Coast lines	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.3	4.3	2	.....
Gulf, Colorado & Santa Fe	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.1	2.1	2	.....
Atlanta & West Point	6.0	12.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Atlantic Coast Line	492.9	578.9	2.6	4.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	106	48
Baltimore & Ohio	879.0	1,676.9	.....	.....	.....	.....	.....	.....	.....	.....	8.5	8.5	.....	.....	241	2
Baltimore & Ohio Southwestern	59.4	114.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	4
Baltimore & Sparrows Point	3.0	6.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	2
Bessemer & Lake Erie	195.0	286.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	88	7
Boston & Maine	28.2	34.7	.....	.....	.....	.....	.....	.....	4.8	9.6	.....	.....	.....	.....	9	3
Buffalo, Rochester & Pittsburg	421.9	545.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	93	48
Caldwell & Northern	2.4	2.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Central of Georgia	59.7	67.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19	5
Central Vermont	.....	.....	.....	.....	.....	.....	0.4	0.4	.....	.....	1.1	1.1	.....	.....	2	.....
Chesapeake & Ohio	1,195.8	1,372.0	.....	.....	.....	.....	147.4	147.4	92.1	184.2	28.9	37.7	7.7	8.8	367	75
Coal River	.....	.....	51.3	51.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	10
Chicago & Alton	352.1	390.0	.....	.....	.....	.....	.....	.....	19.2	19.2	.....	.....	18.5	18.5	82	30
Chicago & Eastern Illinois	161.1	217.3	8.9	10.2	.....	.....	56.9	56.9	.....	.....	.....	.....	.....	.....	36	14
Chicago & Northwestern	1,984.5	2,021.0	531.2	743.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	391	244
Chicago & Western Indiana	.....	.....	.....	.....	9.5	22.2	.....	.....	.....	.....	.....	.....	.....	.....	19	.....
Chicago, Burlington & Quincy	5,912.0	5,918.0	1,504.0	2,043.0	.....	.....	1,201.8	1,201.8	.....	.....	56.9	56.9	.....	.....	1,102	770
Chicago Great Western	288.9	315.7	.....	.....	.....	.....	.....	.....	.....	.....	.5	.5	1.6	1.6	63	22
Chicago, Milwaukee & St. Paul	3,864.3	4,249.7	.....	.....	.....	.....	.....	.....	.....	.....	1.0	1.0	8.7	8.7	646	262
Chicago, Milwaukee & Puget Sound	.....	.....	622.7	622.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	.....
Montana	.....	.....	92.9	92.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	.....
Chicago, Rock Island & Pacific	409.7	471.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.0	9.0	77	31
Chicago, St. Paul, Minneapolis & Omaha	269.8	269.8	385.9	450.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	122	54
Cincinnati & Muskingum Valley	11.4	11.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Cincinnati, Hamilton & Dayton	100.9	128.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29	9
Cleveland, Akron & Columbus	142.1	157.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31	.....
Colorado Midland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.5	2.5	2	2
Cornwall & Lebanon	22.0	35.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	7
Cumberland & Pennsylvania	7.3	13.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	3
Cumberland Valley	14.6	14.6	.....	.....	.....	.....	2.0	2.0	.....	.....	.....	.....	.....	.....	10	.....
Davenport, Rock Island & Northwestern	.....	.....	.....	.....	.....	.....	41.7	42.8	.....	.....	.....	.....	.....	.....	11	6
Delaware & Hudson	.....	.....	6	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Delaware, Lackawanna & Western	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.6	1.6	.....	.....	2	.....
Duluth & Iron Range	.....	.....	16.8	18.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	4
Duluth, South Shore & Atlantic	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.2	4.2	2	.....
Durham & Southern	56.0	56.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	9
Erie	476.2	643.8	.....	.....	786.2	1,237.5	.....	.....	.....	.....	.....	.....	.....	.....	370	74
Chicago & Erie	248.8	257.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	8
Columbus & Erie	22.4	32.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3
New Jersey & New York	.....	.....	.....	.....	26.1	26.1	.....	.....	.....	.....	.....	.....	.....	.....	11	5
New York, Susquehanna & Western and Wilkes-Barre & Eastern	.....	.....	.....	.....	20.7	20.7	.....	.....	.....	.....	.....	.....	.....	.....	17	2
Grand Rapids & Indiana	2.2	4.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3

(Continued on next page.)

TABLE 3.—(*Continued*).

Names of railroads.	Morse telegraph.		Telephone.		Electric bells.		Controlled manual.						Electric train staff.		Block signal stations.	
							No track circuit.		Track circuit at stations.		Continuous track circuit.					
	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Total number.	Number closed part time.
Great Northern	174.8	174.8					65.5	65.5					19.9	19.9	59	3
Hocking Valley	74.7	74.7													24	11
Illinois Central							5.0	10.0							2	
Iowa Central	11.0	11.0													3	
Kansas City, Clinton & Springfield	5.9	5.9	2.5	2.5											5	5
Kentucky & Indiana Bridge & Railroad Company	10.6	14.7													9	
Lackawanna & Wyoming Valley			1.2	2.4									2.2	3.4	3	1
Lehigh Valley	735.6	786.1											6.2	6.2	161	108
Long Island					14.1	28.2			8.6	17.2					37	10
Louisville & Nashville	135.1	179.0													47	
Marquette & Southeastern	3.7	3.7													2	2
Minneapolis, St. Paul & Sault Ste. Marie	1,967.7	1,967.7	24.4	24.4											214	180
Missouri Pacific	15.8	15.8					1.9	1.9			1.2	1.2	8.2	8.2	11	3
St. Louis, Iron Mountain & Southern	4.6	4.6			.5	.5			1.1	2.2	1.2	1.2			7	
Mobile & Ohio	42.4	42.4													15	
Monongahela Connecting	4.0	8.0													6	
Nashville, Chattanooga & St. Louis	95.2	100.6													36	
Newburgh & South Shore							5.2	7.3							4	4
New York Central Lines:																
Boston & Albany											6.6	6.6			12	
Chicago, Indiana & Southern	17.4	17.4													6	3
Cleveland, Cincinnati, Chicago & St. Louis	867.1	1,292.9													221	41
Lake Erie & Western	18.6	27.5													5	2
Lake Shore & Michigan Southern	972.7	995.8	20.0	20.0											167	105
Dunkirk, Allegheny Valley & Pittsburg	90.3	90.3													17	15
Lake Erie, Alliance & Wheeling			87.7	87.7											22	16
Michigan Central	920.2	939.3													143	73
New York Central & Hudson River	2,194.0	2,687.0	4.5	14.6	1.4	2.8	4.0	8.0	45.9	122.2	437.6	1,264.5			768	278
Peoria & Eastern			5.3	7.0											6	
Pittsburg & Lake Erie							24.4	27.3							11	5
New York, New Haven & Hartford	304.4	350.8							234.8	621.2	3.0	6.0			192	61
Norfork & Western	1,657.1	1,843.4													215	158
Northern Pacific	1,046.5	1,156.9	231.7	384.7									1.3	1.3	232	57
Pennsylvania[a]	2,017.0	3,238.0	186.9	345.3							10.9	10.9			603	
Northern Central	432.2	616.4									.7	1.4			118	
Pennsylvania Company	703.5	1,212.4	14.1	18.9											200	4
Philadelphia, Baltimore & Washington	287.6	514.4									1.4	2.8			89	
Pittsburg, Cincinnati, Chicago & St. Louis	1,083.2	1,660.3	2.5	3.6							8.5	8.5			273	19
West Jersey & Seashore	51.4	51.4	29.0	58.0											23	
Peoria & Pekin Union	6.0	12.0													3	
Pere Marquette	19.0	19.0													4	
Philadelphia & Reading	275.8	400.4	1.1	1.3							1.1	1.1	2.0	2.0	105	34
Atlantic City	22.3	22.3													7	7
Northeast Pennsylvania													1.7	1.7	2	2
Perkiomen	38.3	38.3													12	9
Reading & Columbia	35.7	35.7													12	12
Queen and Crescent Route:																
Cincinnati, New Orleans & Texas Pacific													.9	.9	2	
Richmond, Fredericksburg & Potomac	87.0	166.9											.7	.7	22	4
St. Joseph & Grand Island					0.3	0.3									1	
St. Louis & San Francisco	4.1	8.2	383.9	400.4									3.0	3.0	76	36
St. Louis Merchant's Bridge Terminal	1.1	2.2													3	
Seaboard Air Line	206.6	206.6											6.9	6.9	45	16
Southern	1,589.5	1,784.2	9.1	9.1											341	74
St. Louis—Louisville lines	62.5	62.5											5.9	5.9	17	8
Southern Pacific—Pacific System											1.0	1.0	94.4	94.4	39	
Terminal Railroad Association of St. Louis									1.1	2.2					2	
Union							0.9	0.9			.5	.5			2	
Union Pacific													11.1	11.1	4	
Vandalia	237.9	274.2													55	
Virginian	2.2	2.2													2	
Wabash	1,820.7	1,914.7													261	128
Washington Southern	31.2	62.4													9	
Wisconsin Central			4.4	8.8											4	
Total	38,073.8	44,978.8	5,644.0	7,238.5	858.8	1,338.3	1,557.1	1,572.2	407.6	978.0	572.2	1,413.0	261.3	284.2	9,439	3,322

TABLE 4.—PRACTICES IN THE OPERATION OF THE MANUAL BLOCK SYSTEM.

Names of railroads.	Permissive signaling forbidden.		Permissive signaling allowed.						Rear end protection only.		Signals opposite office.	
			By three-position signal.		By two-position signal or flag.		By caution card.					
	Miles of road.	Miles of track.	Miles of road.	Milea of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.
Atchison, Topeka & Santa Fe	38.3	58.9	1,418.8	1,812.6								
Coast Lines	4.3	4.3										
Gulf, Colorado & Santa Fe			2.1	2.1								
Atlanta & West Point	6.0	12.0										
Atlantic Coast Line	11.6	17.3					[a] 483.9	[a] 566.1	407.6	407.6	487.9	568.2
Baltimore & Ohio	96.9	168.1	[a] 790.6	1,517.3								
Baltimore & Ohio Southwestern			[a] 59.4	114.5								
Baltimore & Sparrows Point			3.0	6.0					[c] 3.0	6.0		
Bessemer & Lake Erie	.9	.9					[a] 194.1	285.1				
Boston & Maine	4.8	9.6	28.2	34.7							28.2	34.7
Buffalo, Rochester & Pittsburg					[d] 421.9	545.2						
Caldwell & Northern	2.4	2.4										
Central of Georgia	59.7	67.1										
Central Vermont	1.5	1.5										
Chesapeake & Ohio							[d] 1,471.9	1,750.1			1,028.1	1,060.5
Coal River							51.3	51.3				

(Continued on next page.)

TABLE 4.—(*Continued*).

Names of railroads.	Permissive signaling forbidden.		Permissive signaling allowed.						Rear end protection only.		Signals opposite office.	
			By three-position signal.		By two-position signal or flag.		By caution card.					
	Miles of road.	Miles of track.	Miles of road.	Milea of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.	Miles of road.	Miles of track.
Chicago & Alton	37.7	37.7					a 352.1	390.0				
Chicago & Eastern Illinois	12.9	12.9	a b d 214.0	271.5								
Chicago & Northwestern							ad 2,515.7	2,744.2			2,515.7	2,744.2
Chicago & Western Indiana					9.5	22.2						
Chicago, Burlington & Quincy	58.3	58.3			d 8,616.4	9,161.4			d 6,803.8	7,206.4	8,673.3	9,214.1
Chicago Great Western	291.0	317.8										
Chicago, Milwaukee & St. Paul	743.9	766.6					ad 3,130.1	3,492.8				
Chicago, Milwaukee & Puget Sound							a 622.7	622.7				
Montana							a 92.9	92.9				
Chicago, Rock Island & Pacific			9.0	9.0			418.7	480.5			409.7	471.5
Chicago, St. Paul, Minneapolis & Omaha							a b 655.7	719.8				
Cincinnati & Muskingum Valley			d 11.4	11.4							11.4	11.4
Cincinnati, Hamilton & Dayton			a 59.1	87.0	a 41.8	41.8						
Cleveland, Akron & Columbus			b 142.1	157.7							142.1	157.7
Colorado Midland	2.5	2.5										
Cornwall & Lebanon					a 22.0	35.7						
Cumberland & Pennsylvania	3.0	9.0	a 4.3	4.3								
Cumberland Valley	3.5	3.5					13.1	13.1	13.1	13.1		
Davenport, Rock Island & Northwestern					a 41.7	42.8						
Delaware & Hudson	.6	.6										
Delaware, Lackawanna & Western	1.6	1.6										
Duluth & Iron Range							16.8	18.8	16.8	18.8		
Duluth, South Shore & Atlantic							d 4.2	4.2				
Durham & Southern									56.0	56.0		
Erie			a 1,262.4	1,881.3							963.1	1,428.7
Chicago & Erie			a 248.8	257.2							240.4	240.4
Columbus & Erie			a 22.4	32.2							22.4	32.2
New Jersey & New York			a 26.1	26.1							26.1	26.1
New York, Susquehanna & Western and Wilkes-Barre & Eastern			a 20.7	20.7							20.7	20.7
Grand Rapids & Indiana	2.2	4.4										
Great Northern	10.4	10.4					a d 249.3	249.3			259.7	259.7
Hocking Valley									c 74.7	74.7		
Illinois Central	5.0	10.0										
Iowa Central					a 11.0	11.0						
Kansas City, Clinton & Springfield	8.4	8.4										
Kentucky & Indiana Bridge & Railroad Company			a 10.6	14.7								
Lackawanna & Wyoming Valley	3.4	5.8										
Lehigh Valley	741.8	792.3										
Long Island							22.7	45.4				
Louisville & Nashville	8.5	8.5	126.6	170.5								
Marquette & Southeastern			3.7	3.7								
Minneapolis, St. Paul & Sault Ste. Marie							a 1,992.1	1,992.1	1,992.1	1,992.1		
Missouri Pacific							a 20.0	20.0				
St. Louis, Iron Mountain & Southern	2.3	3.4			.5	.5			4.6	4.6		
Mobile & Ohio	17.6	17.6			a 24.8	24.8			24.8	24.8	42.4	42.4
Monongahela Connecting					a 4.0	8.0						
Nashville, Chattanooga & St. Louis	95.2	100.6										
Newburgh & South Shore			5.2	7.3					5.2	7.3	1.0	2.0
New York Central Lines:												
Boston & Albany	6.6	19.4										
Chicago, Indiana & Southern	17.4	17.4										
Cleveland, Cincinnati, Chicago & St. Louis	863.3	1,189.1			b 12.8	12.8						
Lake Erie & Western	18.6	27.5										
Lake Shore & Michigan Southern	992.7	1,015.8									969.6	969.6
Dunkirk, Allegheny Valley & Pittsburg	90.3	90.3									90.3	90.3
Lake Erie, Alliance & Wheeling	87.7	87.7									87.7	87.7
Michigan Central	920.2	939.3									920.2	939.3
New York Central & Hudson River	2,682.2	4,288.8					295.2	590.4				
Peoria & Eastern					b 5.3	7.0						
Pittsburg & Lake Erie	24.4	27.3										
New York, New Haven & Hartford	542.2	978.0										
Norfolk & Western	404.0	450.8	1,253.1	1,392.6					1,253.1	1,392.6		
Northern Pacific	425.8	530.0					a 853.7	1,012.9			1,279.5	1,542.9
Pennsylvania	653.1	871.2	d 1,542.1	2,701.0	19.6	19.6	19.6	19.6				
Northern Central	1.3	2.6	a 431.6	615.4								
Pennsylvania Company			b d 717.6	1,231.3							717.6	1,231.3
Philadelphia, Baltimore & Washington	152.5	307.5	a 136.5	209.7							34.4	34.4
Pittsburg, Cincinnati, Chicago & St. Louis			b d 1,094.2	1,672.4							1,094.2	1,672.4
West Jersey & Seashore	80.4	109.4										
Peoria & Pekin Union			a 6.0	12.0								
Pere Marquette	19.0	19.0									19.0	19.0
Philadelphia & Reading	30.5	47.0					b 249.5	357.8				
Atlantic City	22.3	22.3										
Northeast Pennsylvania	1.7	1.7										
Perkiomen							a b 38.3	38.3				
Reading & Columbia							b 35.7	35.7				
Queen & Crescent Route:												
Cincinnati, New Orleans & Texas Pacific					a b .9	.9						
Richmond, Fredericksburg & Potomac							87.7	97.5				
St. Joseph & Grand Island									b 0.3	0.3		
St. Louis & San Francisco	3.0	3.0					a 388.0	408.6				
St. Louis Merchants' Bridge Terminal	1.1	2.2									1.1	2.2
Seaboard Air Line	6.9	6.9					a 206.6	206.6				
Southern	10.8	10.8					a 1,587.8	1,782.5				
St. Louis-Louisville Lines	5.9	5.9					a 56.4	56.4	6.1	6.1		
Southern Pacific—Pacific system	95.4	95.4										
Terminal Railroad Association of St. Louis	1.1	2.2										
Union	1.4	1.4										
Union Pacific							11.1	11.1				
Vandalia			237.9	274.2							237.9	274.2
Virginian	2.2	2.2										
Wabash							a 1,820.7	1,914.7	849.1	849.1		
Washington Southern							b d 32.1	64.2				
Wisconsin Central	4.4	8.8										
Total	10,444.6	13,694.9	9,887.5	14,550.4	9,232.2	9,932.8	17,989.7	20,134.7	11,510.3	12,059.5	20,323.7	23,177.8

a By dispatcher.
b By rule.
c Applies only to passenger trains.
d Applies only to freight trains.

SHOP NOTES FROM THE C., ST. P., M. & O.

The sketch herewith (Fig. 1) shows a device used at the St. Paul shops of the Chicago, St. Paul, Minneapolis & Omaha for turning off the riveted ends of crank pins to remove them from driving wheel centers, instead of chipping them. A hole is first drilled in the center of the crank pin to admit the small center-guide pin of the device. The drill is driven by an air motor, the whole being clamped to the wheel by an "old man." The cross-bar carrying the tool is adjustable in the direction of its length, being held by the cap screw in the forward end of the stock. It is made of 1-in. diameter tool steel and has a ⅝-in. flat for the cap screw bearing. The tool is connected back to the sliding collar by a small rod and slides through the cross-bar as it is fed up to the work. The set screw in the end of the bar, which has a jam-nut, holds the tool steady. The tool is fed forward by a clamp or wrench of ½-in. round steel which fits in the groove in the screw collar back of the sliding collar. The device has a range of 8 in. diameter.

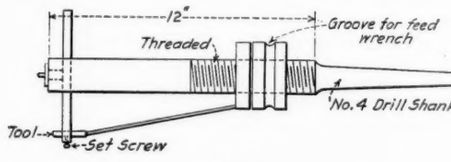


Fig. 1.

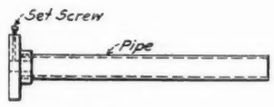


Fig. 2.

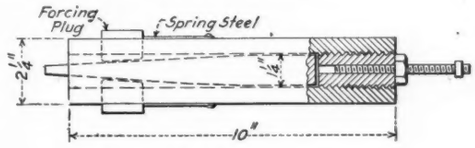


Fig. 3.

Shop Devices; Chicago, St. Paul, Minneapolis & Omaha.

A simple holder for grinding squares on taps having the square broken off, to save setting up in a milling machine, is shown in Fig. 2. The tap is held by a set screw having a fine thread to prevent its working loose. The hole in the head is made for the larger taps, and a special holder for insertion in this hole is provided for small-size taps. The pipe handle is a drive fit in the head.

A device for starting stuck bolts is shown in Fig. 3. The barrel, which is 2¼ in. in diameter, is made of heavy steel tubing, 1¼ in. inside diameter. The two forcing-plugs are each secured to the barrel by a piece of spring steel and are forced apart by the wedge-shaped piece within the barrel, this piece being circular above the wedge part and a loose fit in the tube. It is retained by the pressure of the forcing-plug springs. The wedge is forced forward by the screw, which is threaded through the bush nut in the back end of the tube. In using the device the plug opposite the one in contact with the bolt must have a solid backing, of course.

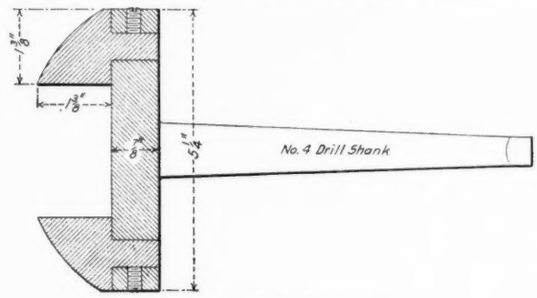


Fig. 4—Ball Reamer.

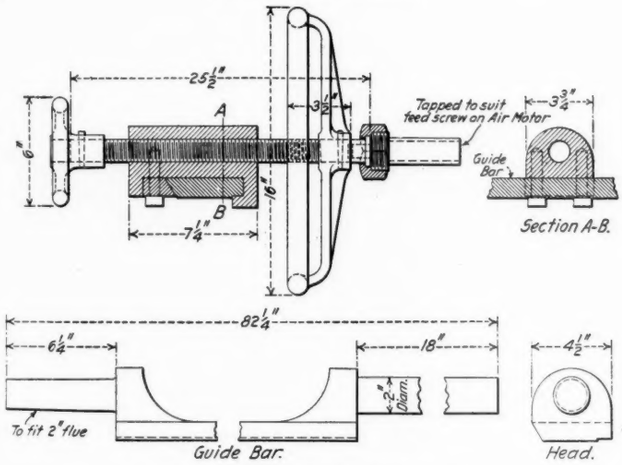


Fig. 5—Front End Drilling Rig.

The ball reamer shown herewith, Fig. 4, has the advantages of being easily made and easy to sharpen and repair. Danger in hardening is minimized, and one holder can be used for balls of different radii. As the plan view of the sketch indicates, the particular style here shown has six cutter inserts, and is for a 5¼-in. ball having a 2¾-in. radius. These inserts are circular in plan and are 1⅜ in. in diameter. They are held by set screws bearing against a ½-in. flat on the insert shank, as shown.

Valve and wheel trams are made with removable points for convenience of grinding. For wheel trams the bar, which is round, is split at the end and the point clamped with a screw. For the valve tram the point that is in line with the bar is screwed into the end of the same and held by a jam-nut. Stuffing box spanners also are made with inserted points, long enough so that in case of breakage they can be reground.

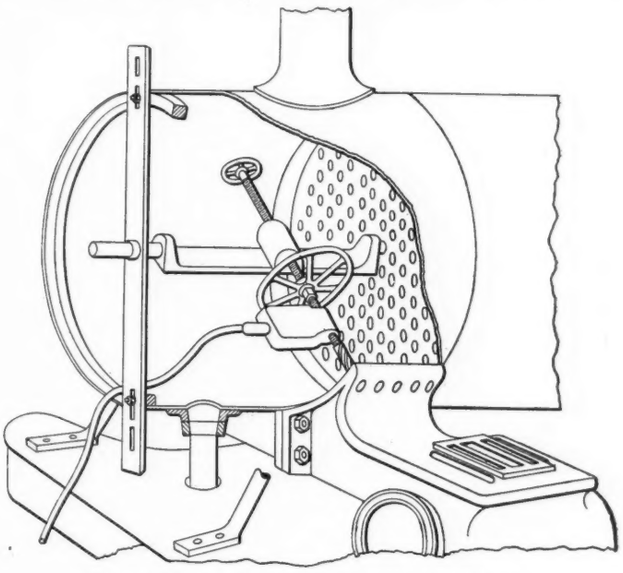


Fig. 6—Front End Drilling Rig in Position.

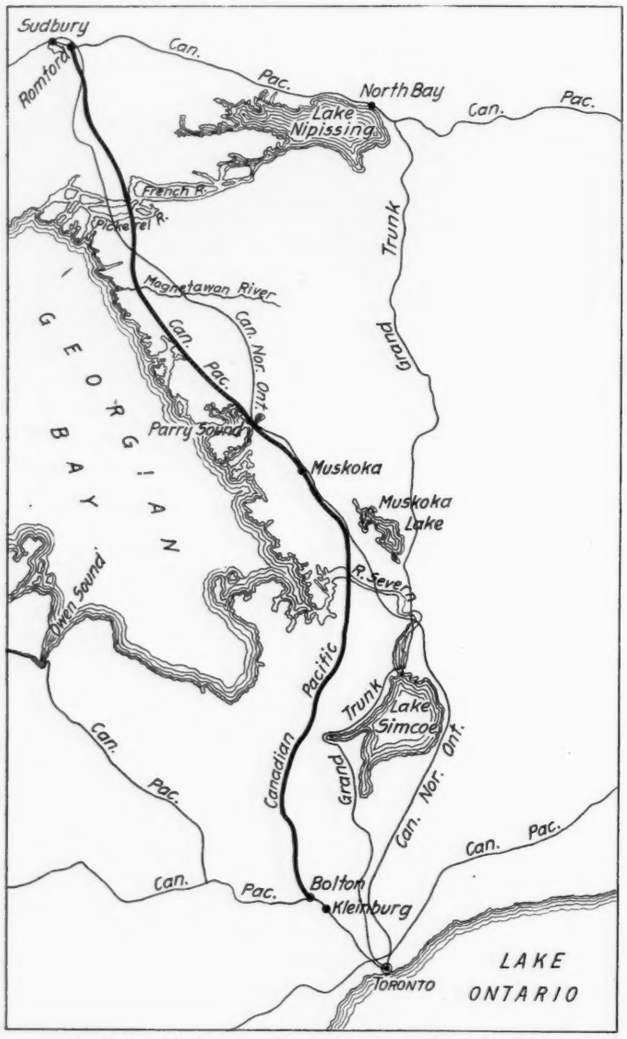
A rig for drilling holes in boiler front-ends which have been newly applied in the course of general repairs is shown in Fig. 5, and a perspective sketch of its application in Fig. 6. As shown by the latter, the head slides on a guide-bar having one end inserted in a central flue and the other supported by a flat bar bolted to the smoke-box ring. The drilling is done with an air motor, and, as will be seen from Fig. 6, any point within the smoke arch can be reached without difficulty.

All but the last of these devices were invented by Arthur Munch, Tool Room Foreman at these shops.

SUDBURY-KLEINBURG BRANCH OF THE CANADIAN PACIFIC.

BY F. S. DARLING, M. AM. SOC. C. E.*

The Canadian Pacific Railway, as built through the province of Ontario, consisted of the main line through the northern part of the province and the Ontario section through the southern and thickly settled portion, the two joining near the easterly end of the province. This gave a long roundabout route for the shipment of manufactured goods from the factories in Ontario to the West. To avoid this long detour of some 444 miles, a traffic agreement was entered into between the Canadian Pacific and the Grand Trunk, whereby freight was handled over the Grand Trunk between a point on the

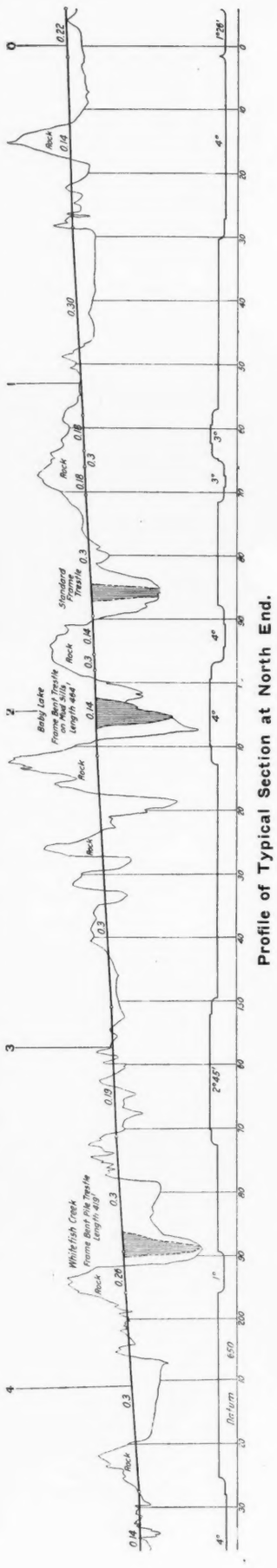


Sudbury-Kleinburg Branch; Canadian Pacific.

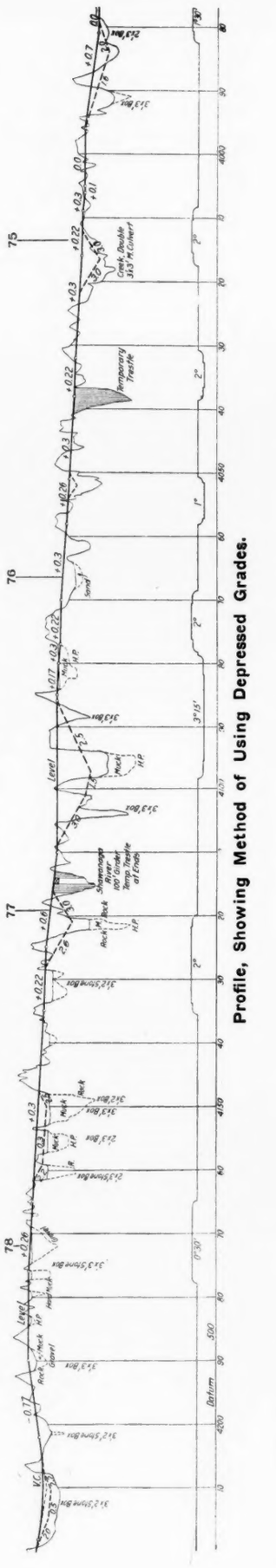
Ontario system of the Canadian Pacific and North Bay, which is on the main line in the northeastern part of the province; the Grand Trunk also handled Canadian Pacific coaches on its passenger trains. This arrangement saved 217 miles.

As the West began to settle up, and the shipments in that direction became larger, the Canadian Pacific felt the necessity of having a track of its own, joining the Ontario system with the main line to the West. The Minneapolis, St. Paul & Sault Ste. Marie from St. Paul and Minneapolis, and the region adjacent, connects with the Canadian Pacific main line at Sudbury. It was therefore important that a line joining the Ontario system with the main line connect either at Sudbury or some point east of it. In 1898 a survey was

*Division Engineer, Canadian Pacific Ry.

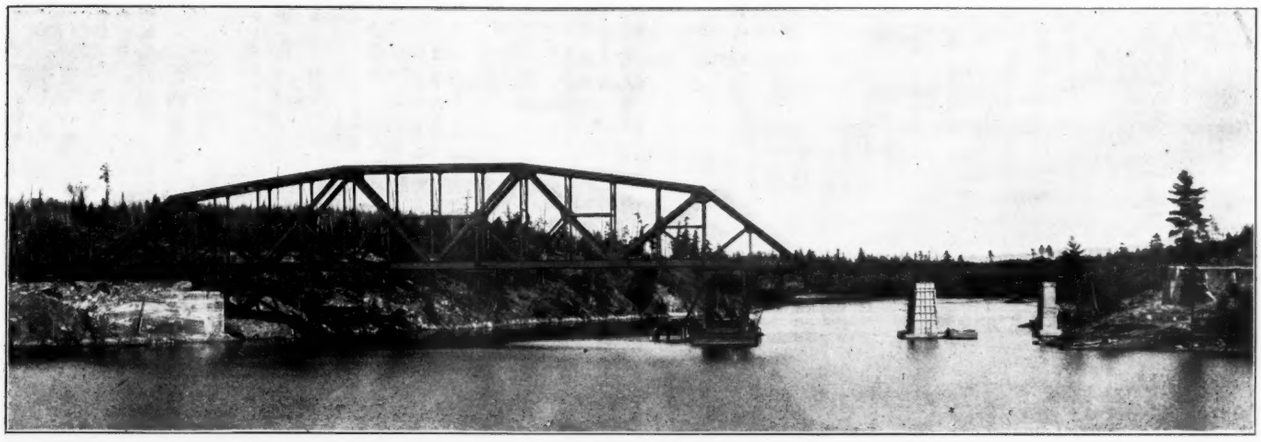


Profile of Typical Section at North End.

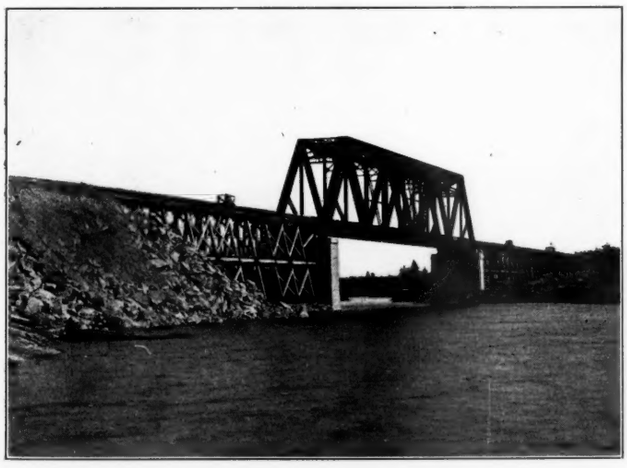


Profile, Showing Method of Using Depressed Grades.

made for a line between Woodbridge, on the Owen Sound section, 17 miles northwest of Toronto, north to Romford, on the main line, seven miles east of Sudbury. This line as located had a maximum grade of 1 per cent. in both directions and maximum curves of 6 deg. The line thus located was not built at that time, however. In 1902 the company decided the connecting line must be built and a new reconnaisance and a survey were made to see if it was possible to improve the old location. The reconnaisance and reports showed that a 0.3 per cent. compensated grade in both directions could be secured on virtually the same route as the other location, with a 4 deg. maximum curvature. Preliminary and location surveys were therefore made, giving the gradient and curvature mentioned, without lengthening the line or increasing greatly the cost of the work. A shorter line could have been obtained by hugging the shore of Georgian Bay more, but this would have left out the Muskoka lake region, to which there is a large tourist traffic. For this reason the line was thrown to the eastward along the westerly shores of the Muskoka lakes.



French River Bridge.



Pickerel River Bridge.

The survey for this line showed the total distance to be 226.5 miles, reducing the distance between Toronto and Sudbury by 46 miles as compared with the North Bay route. The northerly 160 miles was through a country composed entirely of bald granite rock and muskeg swamps, and very sparsely settled; in fact the upper 100 miles had no settlement along the line. The granite was badly broken and upheaved. The southerly 66 miles was through a good farming country.

The direction of the line and its closeness to Georgian Bay on the north avoided any pronounced high lands. Owing to the light grade used it became necessary to take advantage of every low point in the hills, as heavy cutting was extremely costly on account of the nature of the material to be handled. This necessitated keeping up on the high ground as much as possible, and out of the swamps. The territory through which this line runs is a timber country, and the streams, both main and tributary, are run with logs by lumber companies in the spring. On account of this it was necessary to keep the grade high enough above these swamps to allow them to be flooded in the spring when the lumber firms put in their dams and back up the water in the swamps to float their logs. Also, where there were long stretches of tamarack swamps which were not flooded by lumber companies, and which had extremely deep soundings, it became necessary to cross them with a grade line just above the surface line, leaving sufficient room for a good matting of corduory. The grade line of the profile became a very complicated question on this account. The cuttings were all bald rock and 90 per cent. of the fills were across tamarack swamps. The cost of handling the granite rock being very high, and timber for temporary bridging being very costly, the grade line was laid high in cuts to avoid as much rock cutting as possible and yet allow enough material to get across the fills. To accomplish this, temporary depressed grades were resorted to to get across fills and avoid the heavy rock cuttings. This allowed the grade line to be laid high in the cuts and low across the fills. These depressed grades were put in with a 3 per cent. gradient and the cuts made just large enough to give the necessary material to carry across the fill to enable the track to be laid; a work train doing the balance of the filling of the embankments with earth, which could be handled far more cheaply than the rock.

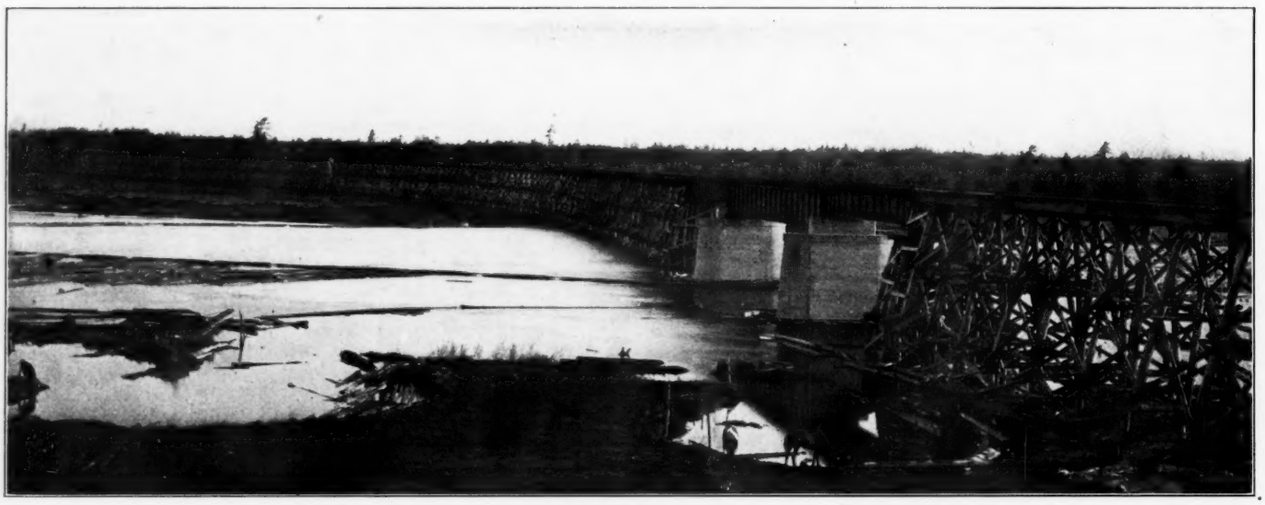
The bottoms of the embankments were all made of rock, which acted as a cutting edge in the tamarack swamps for carrying to rock bottom the embankments when filled later. This bottom layer of rock, when it became heavier than the swamp, sank straight down until it reached its equilibrium, and these rock fills were brought up to a point above the water line so that the track could be laid across. When the embankment was put on, the additional weight sank the rock down to the bottom and carried the fill along with it. The fills were thus carried straight down and avoided the fanning out of the embankments, as is most always the case in filling swamps with earth. In most cases on this line the train-filling could be done 20 per cent. cheaper than by filling with rock.

Velocity grades were also used in several places to avoid extremely heavy work. They were put in at very few points, however, and only where absolutely necessary, as it was very important, on account of the cost of the line and the length of time it would take to build it, to have it opened up to

travel as quickly as possible; also, to have the velocity grades placed so that they would not interfere with the hauling of freight trains loaded for a 0.3 per cent. grade. Furthermore, they were put at points where they could be taken out, whenever the traffic warranted, by train-filling, no further rock cutting being required.

The line was built under Canadian Pacific standard specifications, using steel or concrete for all openings. At points where not enough material was obtainable for making large fills, even by using depressed grades, standard Canadian Pacific timber trestles were put in to gain time in construction. These timber bridges are to be filled later, as soon as the life of the timber is gone. The permanent abutments, piers, arches, etc., were all built during the construction of the roadbed. Great difficulty was encountered in building these concrete substructures for the bridges and arches ahead of the track, as there were no roads in the country to facilitate handling the material, nor were there any railways within a number of miles, nor water transportation. Materials had to be teamed, in some cases, 20 miles across a wilderness.

The track, which has 80-lb. rails, was laid on this uncompleted roadbed, and over this the heavy steel bridges had to be transported to continue the track construction. All the heavy bridge material was carried over this skeleton track without accident to a single bridge member. As soon as the track-laying was far enough advanced, the train-filling was begun and pushed vigorously, the line being virtually completed this winter. Very little or no damage was done to the rails by using them on the temporary roadbed in spite of hauling the heavy bridge material and the filling trains over the skeleton track.



Magnetawan Trestle.

As was to be expected on a line through a country abound-

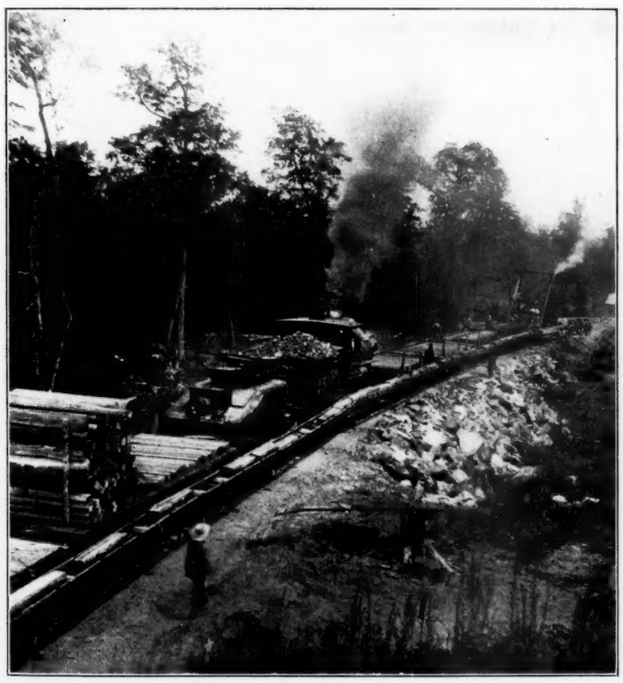
Baby Lake.

ing in swamps, there was considerable trouble from the fills continuing to settle, but, as anticipated, they settled straight down and gave very little difficulty beyond this continuous settlement until solid bottom was reached. These swamp fills have now nearly all settled virtually to solid foundation.

Several large bridges were necessary in the construction of this line, one being the French river bridge, having a span of 415 ft., with two 60-ft. plate girder approach spans. This river is the proposed route of the Georgian Bay ship canal.

Seguin Valley Viaduct; Parry Sound.

The large span was erected on the shore, the outer end resting on a truss carried on floats, and when finished it was jacked into position. It is designed to be used as a draw span later, if the ship canal is ever constructed, by building a pivot pier under it. The Pickerel river has a 249-ft. span. The Seguin valley viaduct is a combination steel trestle and truss bridge 1,694 ft. long. It crosses over part of the town of Parry Sound and is 120 ft. high at the highest point. The



Track Laying.

Severn river bridge has a span of 208 ft. There are also many plate girder spans, from 10 ft. to 110 ft. in length.

All sidings in the rock country were excavated through the rock cuts, and the embankment portion made later by train-filling. Canadian Pacific standard buildings of all kinds have been built at the various sidings. A divisional yard was built where the site had to be hewn out of solid rock. It has six miles of track and locomotive terminal facilities, including an eight-stall concrete engine house, a 70-ft. turntable, water tanks, coaling station, Ord ashpit, boiler and engine house, electric light plant, sand and oil house, etc.

The construction of this line involved moving 2,111,000 cu. yds. of solid rock, 488,000 yds. of loose rock, and 3,511,000 yds. of common excavation, requiring the use of 6,300,000 lbs. of dynamite and powder. The bridges and culverts took 80,000 barrels of cement. All concrete substructures are a broken rock or gravel 1:3:5 mixture, using local Portland cements. There was also put into the work to bring it to the true grade 3,509,000 yds. of train-filling. During the past year 24 work trains were used on the work, which was pushed forward winter and summer alike. Hart convertible cars, Lidgerwood unloaders and Jordan ballast spreaders were used for all train-filling and ballasting. To prevent the material from freezing to the bottoms of the Hart cars in the winter, salt brine was thrown on the bottom before loading. No trouble at all was experienced; a train could be left standing with a load over night and could be easily plowed off the next morning. The work was commenced in March, 1904, and the line was opened to traffic on June

North Naiscootyong River Bridge.

15, 1908. Foley Brothers, Larson & Co. built the roadway for the northerly 59 miles; Ross, Harris & Co. built the roadway, laid the track and did the train-filling and ballasting for the next 40 miles, and the Toronto Construction Co. built the roadway, laid the track and did all the train-filling for the southerly 127 miles. This line was built to main line standards, double spiking all curves, using tie plates on all ties, and spring frogs in all switches. Just north of Tottenham, between mile-posts 11 and 13 from the northern terminus, are two miles of doubling grade. This was put in to avoid a loop of five miles which would be necessary to obtain the 0.3 per cent. grade. This loop will be built later, whenever traffic warrants.

RAILWAY RATE MAKING IN PRACTICE.

BY WILLIAM Z. RIPLEY,
Professor of Economics, Harvard University.

II.

THE EXIGENCIES OF RAILWAY COMPETITION.

The foregoing description of the development of a mileage tariff is applicable to only a part of the traffic. A very large volume of tonnage, said to be not less than 75 per cent. in America, 63 per cent. in Prussia and 50 per cent. in the United Kingdom,—moves under special rates made in quite another way in response to the exigencies of commercial competition. The making of these freight rates in practice is an extremely complicated matter. No single road is independent of rates made by its rivals—rates applicable not only to competing commodities and markets, but also as affected by apparently the most remote and disconnected contingencies. Thus railway rates, as has well been said, are not a set of independent threads; they form a fabric. They are so interwoven everywhere that if one thread be shortened, it may cause a kink in the fabric that may run almost anywhere. In order to understand this it will be necessary to describe somewhat in detail the nature of competition as applied to transportation; and then to show by a few concrete illustrations, the various factors which actively enter into the determination of specific rates. Laymen and legislators do not sufficiently appreciate the extremely delicate nature of the work. Much discussion relative to railway competition seems to be based upon the assumption that it consists in the main of the competition of railway lines more or less parallel or else operating under substantially like conditions. As a matter of fact competition in transportation is to a large degree far more complex.

Railway competition is of three entirely distinct sorts. These may be denominated respectively, competition of routes, competition in facilities and competition of markets. The first of these, competition of routes, as the name suggests, is limited to the activities of the carriers alone. It occurs whenever two railways are exposed to identical commercial conditions both at the point of origin and of destination. The rivalry is direct and physical. The only competition possible is that concerning the route by which traffic may move between those two points. Such competition is most likely to arise between more or less parallel lines, as for instance between the various trunk roads from New York to Chicago. The classic instances in our history are of the rate wars due to the West Shore and the Nickel Plate which were built for the express purpose of engendering competition with the then existing lines,—the New York Central and the Lake Shore respectively. The same sort of simple competition prevails of course between a railway and a parallel canal or other waterway. As for instance, between the Erie canal and the trunk lines, or the Illinois Central and the Mississippi river. Such simple competition as this where confined to railways alone almost inevitably leads to one of two results: the roads may remain independent, preventing ruinous rate wars by pooling; or else, as a result of long continued cut-throat competition, the bankrupt road may be bought up and merged with the solvent one. This was the fate of the old New York and New England railway finally purchased by the New Haven system; of the West Shore and Nickel Plate lines and of the Kansas Pacific unloaded on the Union Pacific by Jay Gould. The nature of railway competition is indeed such that no other result than consolidation or pooling can ensue. This first form of competition of routes or as it has been called of alternative routes, often obtains where conditions of competition are more obscure than in these simple instances above named. In the rivalry for the imported plate glass or crockery traffic between the trunk lines and the Gulf roads, the competition is none the less of routes between Liverpool and Chicago, although the water carriage by way of New Orleans or Galveston is so much more roundabout. Freight actually moves from Boston to Chicago by a line 1786 miles long, via Asheville, N. C., while the direct distance is only 1004 miles. Manifold instances of such roundabout carriage have been elsewhere described in full.* They differ from the competition of parallel routes, however, in the important regard, that absorption of the long lines by the short ones becomes both physically and financially impossible. Whenever a large area like the Pacific slope is devoid of manufactures, and wherever the source of supplies is sufficiently concentrated, as for instance in the manufacture of agricultural implements which are almost exclusively made in or about Chicago, we still have to do with a clear case of competition of routes, although a great number of carriers may participate in the business. When molasses or rice are only to be had from New Orleans, the center of such business, the carriers to all tributary consuming points compete for the routing of it over their own respective lines. These carriers may operate either by land or sea or by a combination of both; and they may transport commodities by the most roundabout ways.† The determinant feature, however, distinguishing this class of competition is neither the mode or carriage nor its length; but is found in the fact that the commercial conditions at both ends of the line, points of origin and destination, are identical for each participant in the business. Direct competition of routes therefore has to do with pure transportation,—the creation of place values,—and this being the case the relative cost of service is always a factor of moment.

Competition of facilities, the second of the three phases of railway competition, above-mentioned, deals, as its name implies, not at all with the rates charged but with the facilities or convenience afforded. Such competition is confined solely to rivalry for business at the established rates. Immediately on the appearance of any departure from these conditions the question becomes one of competition of either of the other two sorts. An instance of competition of facilities would be the introduction of reclining chairs or of a superior service in passenger business. When the Rock Island system offered such facilities without an extra charge, it became necessary at once for others to meet this competition in the same way that they would meet a reduction of rates. Any reduction in time of transit for freight business between two given points without extra charge would in the same manner give rise to competition of facilities. Such facilities, however, as might have a distinct money value, as for instance, free storage, cartage, demurrage or milling-in-transit, any one of which practically amounts to giving value without charge, are, of course, equivalent to a reduction of the rate; and do not belong in this class of considerations at all. Only those conveniences or facilities, which, while attempting to secure business may not be compounded for money, should be classified in this group. It should also be observed that competition of facilities may as readily arise between parts of the same railway system or under pooling agreements to maintain rates, as between distinct and independent companies. And such competition between parent and child often arises. Thus, for instance, business was as actively solicited as ever by the Pennsylvania and the Baltimore & Ohio in competition during the several years of financial control of one by the other prior to 1907. The New Haven railway may compete with its own water lines around Cape Cod or on Long Island Sound. But in all of these instances the cardinal feature to note is that the competition is always at the established rate. For New England, although the New Haven system and the Boston and Maine do not compete on rates at their points of contact, there is constant rivalry in respect of facilities or service. The same thing is undoubtedly true of the Atchison and the

*Ripley, Railway Problems, p. 490 *et seq.*

†Albert Fink's detailed description of the numberless alternative routes by which traffic moved into the South, is perhaps one of the best instances in print.—U. S. Reports, Internal Commerce, 1876, App. pp. 1-16. (The Danville, Va., case before the Interstate Commerce Commission is an admirable instance.—Ripley, Railway Problems, pp. 378-404.)

Southern Pacific in the carriage of California fruits. Although operated under pooling agreements, yet they were competitors in the matter of the service offered. Each sought a larger volume of tonnage, but not by cutting the agreed rate.

The third form of competition in transportation is dependent upon the competition of markets; and is not in reality direct competition between carriers at all. This is the most difficult of all forms to understand.* Yet although indirect and often obscure, it is of fundamental and conclusive importance in the determination of freight rates. Commercial competition deals not with a mere choice of routes, but with alternative markets. The carriers act, not independently and of their own volition, but only as agents or representatives for their constituents, the shippers. They may become tools or weapons in the hands of merchants or manufacturers who are the real contestants. It is largely in this sense, that it is so often alleged, and rightfully, that railway traffic managers oftentimes do not *make* rates at all. Their energies are bent to the analysis of those circumstances by which their rates are made for them. The preparation of commodities for final consumption falls naturally into two distinct parts; the creation of form value succeeded by the conferring of place value. Transportation is concerned alone with the latter process. Of these two operations, the latter, the creation of place values, is by far the more elastic and adaptable process. The grower, the miner or the manufacturer has his first costs more or less rigidly fixed by natural or human conditions; such as the fertility of the soil, the grade of ore, the prevailing scale of wages, and so on. His proximity to the status of a marginal producer depends upon his relative position in these respects. With the carrier, matters are more contingent. Including within its reach, as it does, many grades of producers and consumers, each more or less rigidly held bound by his own circumstances and conditions, as above said, the carrier is able to exercise a wide range of choice in fixing the margin of value received which it reserves for itself. And at all times, by reason of the factors set forth elsewhere, primarily its subjection to the law of increasing returns, this intermediate share of the carrier tends to adjust or accommodate itself to the end that it may discover or produce a wider margin beween values in the hands of producer and consumer respectively. This may be best accomplished by a progressive widening of its field of activities, that is to say, by an enlargement of its physical reach and scope. It is always striving to lower the cost of production made by the marginal producer. Its motto must ever be, to get more business, if not right at home by search for it abroad;—and this always with the chance that the greater the distance between the producer and the consumer, the greater the possible margin of place value, remaining as its individual share.

This ever-present incentive to widen the market carries with it a direct consequence. A market is a commercial area characterized by a prevalent equality of prices. Phenomenal development in this respect is characteristic of the United States. For many commodities the market is coextensive with the national domain. It is the chosen function of transportation agents, by rail and water, to ensure this result; to preserve an equality of prices, despite the variety of producing and consuming conditions. The railway is the agent by which the market is thus widened and rivalries are thus equalized. In railway parlance this is what is known as "keeping everyone in business." The following quotation from the Senate Committee Hearings of 1905 adequately describes the process: "I am interested in the erection of a mill that has just been completed, and sometime since I was figuring on the question of a smokestack. I wanted to have that stack built out of brick that is burned in New Jersey, and that is several hundred miles away. It is a long way to ship freight from New Jersey to North Carolina. A quotation was made me by the stack builder, whose office is in New York, and I remarked to him, 'That price is prohibitive; I cannot pay that price for that stack.' He said, 'That is the best I can do; but if you will tell me what you can afford to pay for that stack, in competition with home-burned brick, I will see what I can do with the railway people.' He said, 'All right; I will take it up with the railway people.' His quotation included the delivery of the brick and the erection of the stack at my plant. It would require something like about fifty carloads of brick to build that stack. Within a week he had his price revised, and gave me a satisfactory quotation and took my contract for the stack. Of course he had to get a special rate from the railway people, because there is no regular tariff on brick from New Jersey to North Carolina." In this instance the railways actually created this new business by so adjusting the margin between the minimum cost of making brick in New York and in North Carolina, as to make it possible for the traffic to move. The special rate here mentioned, however, should be carefully distinguished from a secret rebate offered to one contractor as against another in the same place. This commodity rate, while special to meet a particular contingency, was open to any other shipper similarly circumstanced. The student cannot too carefully discriminate between these two sorts of special rates. They are constantly confused in the public mind. The effect of these open commodity rates is, not to create difference of opportunity between individuals, but to generalize economic conditions and equalize prices throughout wide areas.

The most satisfactory way to describe commercial competition as applied to carriers is by concrete illustrations. There are two distinct varieties or degrees of it, which may be denominated primary and secondary. These might as properly, perhaps, be called simple and complex, or direct and indirect. Of these, the first concerns those cases wherein a commodity undergoes no physical transformation between producer and consumer. Shipments are usually direct. Only one rate is involved. Shall St. Louis and the South, for example, be supplied with salt from the Kansas or Michigan fields? This is a case of pure transportation,—the creation of place value, alone. The Aroostook farmers of Maine compete in prices with the potato growers of Michigan in the New York market. Each district is usually represented by a railway, dependent upon the prosperity of its particular constituency. Competition of markets is usually more keen where a number of carriers are concerned, each representing its own clients; but it may conceivably arise as between several markets served by the same company, especially with the growth of great railway systems. The Southern Pacific must insure a rate from California on oranges to eastern markets, as compared with the rates over the Southern roads from Florida, sufficiently low to warrant the venture of capital in the industry. Marble from the quarries of Vermont and North Carolina, and paving blocks from the Lithonia district in Georgia, and from Wisconsin or South Dakota, must meet in Chicago on even terms. Such competition, although simple and direct, recognizes no national bounds. Copper from Montana must be laid down in Liverpool at rates to permit of meeting the price on Chili bars from South America. Our entire grain and cotton crops must be transported at rates which will enable them to hold their own in European markets. The California raisin has, in this manner, had to make its way into Eastern markets in the United States against the pressure of importations from Spain, as described in another place. The cotton mills in New England and in the South must have their output carried to China under conditions which will enable them to meet the price made by the British manufacturer. This last instance, however, introduces us to the second form of competition, inasmuch as a double transportation is involved; first from the fields to the mill, and thereafter from the mill to the consumer.

Secondary or indirect forms of commercial competition in

*Albert Fink's description in U. S. Reports Internal Commerce, 1876, App. p. 38, is a classic.

transportation, concerning, as has been said, not one but two distinct carriages of entirely different products, needs to be in turn subdivided still further. The products of agriculture and mines afford the best instances. The lumber business is peculiarly suggestive in this connection, owing to the fact that in the United States a vast treeless area in the Middle West is surrounded with forest tracts available for development. The market again in this case is limited only by our national frontier. Omaha is supplied with yellow pine and cypress from Louisiana after a 1,200-mile haul; Oregon fir brought 1,800 miles in each instance for fifty cents per hundred pounds; and with Michigan hemlock and pine transported less than 500 miles for eleven and a half cents. These various sorts of lumber are all more or less competitive. And in each case the final cost of laying down the product in Omaha is determined; first, by the rate from the stump to the mill, and then as sawed lumber, thence on to destination. The Eau Claire, Wisconsin, lumber case* before the Interstate Commerce Commission, fully describes the intricacies of adjustment needed to hold a number of such producers on a parity. In this instance Eau Claire, "next the stump," as an important lumbering centre was shown to be declining in importance relatively to Mississippi river towns, which received their logs by raft down stream. A differential of a few cents was threatening the welfare of a considerable population. The Wichita, Kansas, cases are suggestive in a similar way. Sugar is laid down at this market from every point of the compass. From Hawaii it is shipped in the raw state to San Francisco, and then brought East, like the Oregon lumber, cheaply, as a backload to counterbalance west-bound shipments of grain and manufactures. From New Orleans refineries comes the Louisiana product, and from the Atlantic sea ports the Cuban sugar; but in each case the carriage is broken at an intermediate point, at which manufacture or jobbing ensues. A large class of operations analogous to this, known as "milling in transit" and "floating cotton," elsewhere described in detail, involve the same complexity and interrelation of rates. The point to carry forward is that commercial competition demands that in every case not single rates but the sums of all the interlocked rates for each competing person or region shall be properly adjusted. If this be not done, some one will be excluded from that market and "put out of business."

By this time in our ascending scale of complexities, it will be observed that manufacture now begins to outweigh mere transportation in importance. With low grade products, like salt or sugar, the increment of value due to transportation is relatively high as compared with manufacturing costs. As the grade of product rises, however, the differences in value and in form between the raw and the finished product render the problem of location of the manufacture more difficult as affected by the relative adjustment of rates of transportation for the two. According to the data of the Federal Bureau of Corporations, the cost of refining crude petroleum, worth three to four cents a gallon at the wells in Pennsylvania, should not exceed one-half cent a gallon. This sum would barely pay for the first hundred miles of its carriage by rail, as ordinarily shipped. The market is, of course, extraordinarily extensive; hence the persistent flagrancy of the practices of secret rebating by the Standard Oil Co.* To obtain such special favors in transportation outweighed in importance the incentive to introduce economies in production. In this industry, where little waste occurs in manufacture, the refineries may well be located at the consumers' door. The manufacture of furniture for the Pacific states, on the other hand, must be located "next the stump," in North Carolina or New England. The long carriage must be applied, not to the bulky lumber but to the finished product. The freight rate on lumber from Oregon to Pittsburgh is just about equal to the value of the logs at the mill. Obviously the large proportion of waste or common lumber will not bear a high addition to its cost by carriage to any distance. In the manufacture of fur hats a shrinkage of weight occurs of one-half between the fur scraps and the finished product. In such a case it is imperative, either that the factory be near the source of supply or that the rate on the two distinct commodiies be nicely adjusted. The decision of the United States Steel Corporation to build a large plant at Duluth for supplying the Northwestern market is the outcome of such considerations. The main point is that the adjustment of a number of rates may determine not only the general welfare of the industry, but even its specific geographical location, with reference to the raw material on the one side and the market on the other.

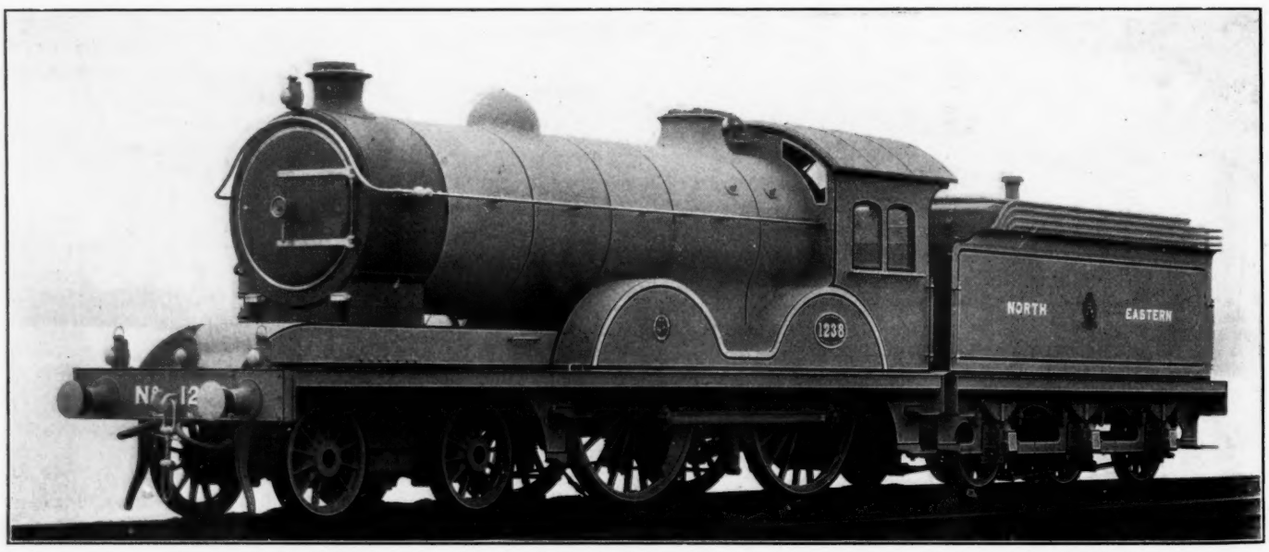
(To be continued.)

*Railway Problems, pp. 203-223.

*We think it should be pointed out, in justice to the Standard Oil Company, that most of this rebating was done at a time when it was accepted practice among large shippers to bargain for their transportation. We believe that the business of the company, as now conducted, is conspicuously free from unfair practices.—Editor.

NEW 4-4-0 ENGINES, NORTH-EASTERN RAILWAY.

We are indebted to Wilson Worsdell, Chief Mechanical Engineer of the North-Eastern Railway, for the details and dimensions of his latest express passenger engines, designed and



Eight-Wheel Passenger Locomotive for the North-Eastern Railway.

built by him at Darlington for the North-Eastern Railway.

The engines are built for working the heavy East Coast express passenger traffic between York and Edinburgh. They are four-wheeled coupled with a four-wheeled truck in front. The coupled wheels are 6 ft. 10 in. in diameter. The cylinders are placed inside the frames and are 19 in. diameter, with a stroke of 26 in. The barrel of the boiler is 11 ft. 6½ in. long and 5 ft. 6 in. diameter outside. The firebox is 9 ft. long, with a grate area of 27 sq.ft. The working pressure is 225 lbs. per square inch.

The engines are designed to work trains equal to 20 carriages loaded, and to run 124½ miles at 53 miles per hour without a stop. The weight of the train behind the tender will vary from 350 to 400 tons. From the above it will be seen that the work these engines are required to do is of the heaviest and fastest description Grades of 1.04 per cent. for about 5 miles and others of 0.66 per cent., 0.59 per cent. and 0.50 per cent. are met on different parts of the line.

The 10 engines of this class are fitted with the patent variable blast pipe and spark ejector which is now being applied to North-Eastern locomotives generally. The blast pipe is designed to relieve the back pressure on the pistons and to eject the sparks from the smokebox.

The driver can regulate the blast on the fire by means of a valve rod and handle in the cab, thus preventing waste of steam. A valve at the bottom of the blast pipe is fully open when the engine is starting and when taking heavy gradients. This increases the blast pipe orifice from 4¾ in. to 7½ in., and consequently reduces the amount of sparks drawn through the tubes into the smokebox. Any accumulation of sparks in the smokebox is prevented by vertical passages cast onto the outside of the blast pipe, as by means of these passages the sparks are ejected after being broken up in passing through them to such smallness that the possibility of causing roadside fires is reduced to a minimum.

The engine may be regarded as typical of the latest development of this class of locomotive in England, and it is especially adapted to the peculiar class of service that it will be called upon to handle.

The following are some of the principal dimensions of these engines:

Cylinders, diameter of cylinders	19	in.
" stroke of piston	26	"
" diameter of piston valves	10	"
" width of ports	1⅜	"
" distance apart of cylinders, c. to c.	2	ft.
" distance bet. centers of valve spindles	1 ft. ½	in.
" lap of valve	1⅛	"
" maximum travel of valve	4⅜	"
" lead, piston valve		
	Forward full gear, 3/16-in. F.P.; 1/16-in. B.P.	
" link motion	Stephenson	
" diameter of piston rod	3¼	in.
" diameter of piston rod, tail end	2½	"
" length of slide block	1 ft. 3	"
" length connecting rod,bet. centers	6 " 8	"
Wheels and axles:		
Diameter of driving wheels	6 " 10	"
Diameter of truck wheel	3 " 7¼	"
Thickness of all tires on tread	3	"
Width of all tires on tread	5½	"
Dist. bet. c. of truck and c. of leading wheels	11 ft.	
Center of truck wheels	6 ft. 6	in.
Centers of driving wheels	9 " 6	"
Distance from center of driving wheels to front of firebox	1 " 10¾	"
Distance from center of truck to front buffer beam	6 " 1	"
Distance from center of trailing wheels to back buffer plate	6 " 5	"
Crank axle, diameter of wheel seat	9	in.
" " " of bearings	8	"
" " " at center	7¾	"
" " distance bet. c. of bearings	3 ft. 10½	"
" " length of wheel seat	7 15/16	"
" " lengths of bearings	9½	"
Main axle, diameter of wheel seat	9	"
" " " of bearings	8	"
" " " at center	7¾	"
" " distance bet. c. of bearings	3 ft. 10½	"
" " length of wheel seat	7 15/16	"
" " length of bearings	1 ft. 0¼	"
Truck axle, diameter of wheel seat	7½	"
" " " of bearings	6	"
" " " at center	5¾	"
" " Length of wheel seat	7¼	"
" " length of bearings	11	"
" " dist. bet. centers of bearings	3 ft. 7	"
Driving, diameter crank-axle pin (inside connecting rods)	8¼	"
" length of bearing (inside conn. rods)	5	"
Driving, diameter of crank pin (coupling rods)	3¾	in.
" length of bearing (coupling rods)	4 1/16	"
Frames, distance between frames	4	ft.
" thickness of frames	1	in.
" distance between truck frames	2 ft. 8	"
" thickness of truck frames	¾	"
Boiler, center of boiler from rail	8 ft. 11	"
" length of barrel	11 " 6½	"
" diameter of boiler (outside)	5 " 6	"
" thickness of plates	5/8	"
Tube plates,copper,thickness smokebox tube plate	1	"
" " pitch of rivets	2	"
" " diameter of rivets	⅞	"
Firebox casing, steel, length outside	9	ft.
" " breadth outside at bottom	3 ft. 11	"
" " depth bel. c. boiler, front end	5 " 3½	"
" " do., at back end	4 " 6½	"
" " thickness of front plate	5/8	"
" " thickness of back plate	5/8	"
" " thickness of sides and top plate	5/8	"
" " distance of copper stays apart	4	"
" " diameter of copper stays	1	"
Inside firebox	Copper	
" " length at the bottom inside	8 ft. 3½	in.
" " breadth at the bottom inside	3 " 2½	"
" " from top of box to inside shell	1 " 7½	"
" " depth box inside at front	6 " 4⅜	"
" " depth of box inside at back	5 " 7⅜	"
Tubes, copper, number of tubes	254	
" number of stay tubes	7	
" length of tubes between tube plates	11 ft. 3⅛	in.
" diameter outside	2	"
" thickness	No. 11 and 13 W. G.	
" diam. variable blast pipe nozzle from 4¾ to 7⅛		"
" height of stack above rail	13 ft. 3	"
" heating surface in tubes	1,579	sq. ft.
" heating surface in firebox	158	"
" total	1,737	"
" area of grate	27	"
Weight of engine in working order:		
On bogie wheels	39,200	lbs.
On driving wheels	94,080	"
Total	133,280	"
Weight of tender in working order:		
On front wheels	30,240	"
On middle wheels	28,672	"
On trailing wheels	33,152	"
Total	92,064	"

Tender.

Wheel base, from front buffer beam to center of leading wheels	4 ft. 2	in.
" " from center of leading wheels to center of middle wheels	6 " 4	"
" " from center of middle wheels to center of trailing wheels	6 " 4	"
" " from center of trailing wheels to back buffer beam	4 " 5	"
Wheels, diameter of wheels on tread	3 " 9¾	"
" thickness of tires	3	"
" width of tires on tread	5½	"
Axles, diameter of bearings	5	"
" length of bearings	10	"
" diameter of wheel seats	7¼	"
" length of wheel seats	7½	"
" distance of centers of bearings	6 ft. 10	"
Frames, distance between inside frames	4 " 1	"
" thickness of inside frames	½	"
" distance between outside frames	6 ft. 2¾	"
" thickness of outside frames	⅞	"
Capacity of tank	3,669	gals.
Capacity of well	456	"
Total	4,125	"
Coal space	5	tons
Tractive effort	21,891	lbs.

$$\frac{\text{Weight on drivers}}{\text{Tractive effort}} = 4.25$$

$$\frac{\text{Total weight}}{\text{Tractive effort}} = 6.08$$

$$\frac{\text{Weight on drivers}}{\text{Total weight}} = 70.60^{*}$$

$$\frac{\text{Tractive effort x diameter drivers}}{\text{Heating surface}} = 1026.51$$

$$\frac{\text{Heating surface}}{\text{Grate area}} = 64.33$$

$$\frac{\text{Firebox heating surface}}{\text{Total heating surface}} = 9.44^{*}$$

$$\frac{\text{Weight on drivers}}{\text{Total heating surface}} = 54.16$$

$$\frac{\text{Total weight}}{\text{Total heating surface}} = 76.72$$

$$\text{Displacement, 2 cylinders, cu. ft.} = 8.53$$

$$\frac{\text{Total heating surface}}{\text{Displacement, 2 cylinders}} = 203.63$$

$$\frac{\text{Grate area}}{\text{Displacement, 2 cylinders}} = 3.17$$

*Per cent.

NOTES ON RAILWAY ELECTRIFICATION.*

BY JOHN A. F. ASPINALL.
General Manager of the Lancashire & Yorkshire Railway.

II.

TRANSMISSION LINES.

Cables form a very costly part of electrical equipment, and their accessibility when laid along a line of railway is one of the points which requires the most careful consideration. The underground railways of London are fortunate in possessing miles of tunnel walls upon which their cables can be neatly fixed, and each one readily got at without any necessity for touching the others. Experience on the Liverpool & Southport line does not point to the practice of laying the cables on the solid system in the 6-ft. way as being satisfactory, and where a railway runs through an open district, there seems to be distinct advantages in having bare wires carried overhead on suitable poles. The arrangement is cheaper to erect, can always be seen, and is much easier to repair. It is to be assumed that a railway company can generally find a path for an overhead transmission along its own property. If the line runs through a populated district, and has numerous telegraph and telephone circuits, with many signals and junctions, and if the points at which the transmission line would cross the railway are numerous, then there is no doubt that cables are the safer and possibly the cheaper in the long run. This is because the conditions stated involve a capital expenditure on the overhead line almost equal to that for cables, and are probably accompanied by an atmosphere that will considerably increase the cost of maintenance of the overhead line, owing to carbon and sulphur which will be deposited from the atmosphere. On the other hand, if a fairly clear run can be obtained, there is no question as to the large economy which can be effected by using overhead conductors. In modern practice large spans are used, the number of poles in some cases not exceeding ten per mile. In the particular instance of the high-tension line connecting Aintree with Seaforth, the cost per mile of the overhead equipment was £1,300, whilst the cost per mile of the cable line was £2,030, the cost per kilowatt transmitted per mile being—for overhead £1.25, for cable £2.67, based on 500 ampères per square inch of conductor section. This, however, does not represent the full saving which might be obtained by overhead transmission, as the spans were necessarily short, and for a certain distance erection was difficult as the line ran on the top of a high embankment. Lightning arresters, a doubtful requirement for the atmospheric conditions prevailing in this country, are also included in the cost for overhead transmission..

BATTERY PLANT.

As may be realized, at the inception of pioneer electrification such as I am describing, it was not easy to forsee exactly what would transpire in the way of load upon the power house and sub-stations. Eventually the fluctuations of load were found to be extremely heavy. When regular working conditions had been in operation for some considerable time, bearing in mind also the fact that the development of traffic would necessitate sooner or later some increase in power house and sub-station plant, it was decided in 1905 to install battery plants. It was felt that these were necessary, not only on account of mechanical requirements, but also with a view to creating an almost absolute assurance that trains could be run during the busiest hours of the day when a large number of business people were using the railway, even if some serious accident happened at the central generating station. The general idea was to put in a battery plant which would keep the whole railway going for one hour.

These batteries were of the well known buffer type, controlled by automatic boosters to respond readily to the load, the main objects and uses of these batteries being:

(1) To equalize the load on the power house and sub-stations.
(2) To reduce the peaks of current and to act as the equivalent of additional plant for such places.
(3) To improve the general load factor and efficiency, and so enable more economical production and distribution of supply to take place.

The railway was originally equipped with a power station containing five generators, four of 1,500 kw., and one of 750 kw. capacity; four sub-stations, three equipped with four 600 kw. rotaries, and one with three 600 kw. rotaries. The number of trains in traffic was twelve, each being equipped with motors rated at 1,200 h.p., and taking a maximum power during acceleration of 1,000 to 1,200 kw. To meet these heavy peaks it was necessary to run 5,250 kw. of power house plant, though the average load was only 3,500 kw. The fluctuations of load were so great that at times the engines would entirely cease to take steam, the vacuum being actually produced in h.p. cylinders; within a few seconds the load would rise to 4,000 or 5,000 kw., and superheated steam would be admitted to the cooled h.p. cylinders. This not only led to uneconomical working, but produced severe stresses in the engine.

It may be asked why the policy of combined rotary and battery stations was not followed, which would doubtless have been done in the case of a railway such as the London Tubes. It would have effected a saving in wages and made it possible to have the load more uniform still at the power station.

About the time it was decided to introduce the battery sub-stations, the traffic had considerably increased, and the lighting at certain points was not all that could be desired. Also power was required at Liverpool, and the drop in potential at the train was becoming too great. It was therefore decided to place the battery sub-stations at points intermediate to the rotary sub-stations, as this would enable the conditions mentioned above to be met and improved. It will be noted from the map, Fig. 1, that one place is almost at Exchange Station, Liverpool, and another at Southport; the former acts as a medium of supply for electric light and power to a large goods yard, Exchange Station and hotel, in addition to its use for tractive purposes. The one at St. Luke's, which is 2½ miles from Birkdale, serves to take the load and general lighting at the Southport end, and assist development in the Crossens direction. These batteries were installed in September, 1905, and the results have amply justified the policy that was adopted. The momentary peaks in the load were reduced from a maximum of 7,000 kw. to 4,500 kw., and the hourly peak during the rush hours was reduced from 3,800 kw. to 3,100 kw., enabling the load to be carried during the winter with 4,500 kw. of plant, and during the summer with 3,750 kw. of plant.

Four battery plants were installed aggregating 5,200 ampère hours. The batteries have a guaranteed efficiency of 85 per cent. in ampère-houre and 75 per cent. in watt-hours. Tests made in 1907 showed that 14 per cent. of the total rotary sub-station direct current output passed through the batteries, the total loss due to the batteries being about 3.5 per cent. of the rotary sub-station output. In addition to fulfilling the purposes for which they were originally installed, the batteries have proved a valuable standby in cases where one or more rotary sub-stations have beeen temporarily disabled, and also for running special trains during hours of shut down. The coal consumption was reduced by 8.5 per cent. and the consumption for train services became 0.412 lb. per ton-mile.

The following table shows the increase in the load since 1905, and the variation of the load during rush hours:

Year.	Average load, rush hour.	Momentary variation peak to minimum.	Kennedy load factor.
1905.....	4,500	7,500-2,590	0.68
	No batteries.		
1906.....	3,600	4,500-2,500	0.90
1907.....	4,000	5,600-3,100	0.98
1908.....	5,000	7,000-4,000	0.90
1908.....	5,600	8,600-2,500	....
Special test.	No batteries.	Variation within 1 minute.	

*From the Presidential address before the Institute of Mechanical Engineers, April 23, 1909.

EFFICIENCY OF TRANSMISSION.

In July, 1906, investigations were made as to overall efficiency of transmission. The direct current meters at the sub-stations were specially calibrated, and with a daily sub-station output of 57,190 units, and a power-house output of 63,819 units, the calculated losses were as follows:

Source of loss.	Units.	Per cent. loss on power-house output.
Cables	1,264	1.97
Transformers	1,885	2.95
Rotaries	3,480	5.37
Total	6.629	10.29

The overall efficiency of transmission from alternating current bus bars being 89.7 per cent. It is exceedingly difficult to ascertain the exact losses in live rails; calculations made, however, in various ways seem to indicate that these losses amount to about 9 per cent. of the sub-station output. The total efficiency from alternating current bus bars to circuit breakers on the trains is about 81 per cent.

In considering the question of coal consumption per unit, the most reliable figure to take for comparison is the coal burned at the power house per unit of direct current delivered to the third rail, that is with all losses due to conversion. This, for twelve months ending December, 1908, was 3.28 lbs. These figures for coal consumption must not be confused with those given for the generating stations.

PARTICULARS OF VARIOUS ELECTRIC LOCOMOTIVES, AND L. & Y. MOTOR CARS.

Name.	Maker.	Type of traction.	No. of motors.	H.-p. of each.	Total, h.-p. Max.	Length, ft. in.	Width, ft. in.	Height. ft. in.	W'ght. tons.	Gear ratio.	Draw-bar pull, lbs.	Remarks.
Metropolitan Railway..	Westinghouse.	D. C.	4	300	1,200	45. 0	....	....	..	.....	.....	120 tons* train at 36 miles per hour.†
Westinghouse	Westinghouse.	1-Ph.	6	250	1,500	45 0	9 8	17 0	135	18/95	50,000 up to 25 miles per hr.	.....‡
North Eastern Goods..	Br. Thomson-Houston Co.	D. C.	4	..	.....	37 11	8 8	11 9	50	3.28	.....	200 ton train at 14 miles per hour on level; 150 ton train start and run 9 to 10 miles per hour with 1 in 27 gradient.§
N. Y. C. & H. R. R.R..	General Electric Co. of America.	"	4	550 nor. 750 max.	2,200 3,000	45 0	9 8	17 0	135	direct.	34,000 max....	450 tons at 60 miles per hour.‖
Baltimore & Ohio	General Electric Co. of America.	"	4	360	720	35 0	9 5	14 0	86	direct.	28,000 full load 48,000 start'g	1,900 lbs. at 12 miles per hour.‖
Baltimore & Ohio	General Electric Co. of America.	"	4	200	.....	29 7	9 3½	14 9¼	73	81/19	35,000 full load 40,000 start'g	2 of these units are used together, giving double the draw-bar pull.‖
Paris-Orleans	General Electric Co.	"	4	250	1,000	34 10	9 7	12 9	49	78/19	24,000 max....	300 tons at 20 miles per hour.‖
Lancashire & Yorkshire Motor-Car.	Dick, Kerr and L. & Y.	"	4	150	600	....	....	....	46	43/22	12,400 up to 20 miles per hr.	2 motor cars take a train of 170 tons total up to 50 miles per hour.
Lancashire & Yorkshire Motor-Car.	Dick, Kerr and L. & Y.	"	2	125	250	....	....	....	22	41/19	4,440 max.....	On level.

*The long ton of 2,240 lbs is ordinarily used in Great Britain.—[EDITOR.]
References: † *Tramway and Railway World*, Vol. 17, p. 530; ‡ *Electric Journal*, Vol. 2, p. 360, and *Tramway and Railway World*, Vol. 17, p. 530; § *Light Railway and Tramway Journal*, Vol. 11, p. 346; ‖ *Electric Railway Engineering*, p. 293.

MAINTENANCE.

One of the necessities of a branch of a steam-worked line being worked electrically is that there should be a local workshop for repairs of the rolling stock close to one of the terminal stations, and this must be considered as part of the cost of equipment.

It has been found to be of the greatest importance to have careful periodical examination of the different parts of the electrical equipment, and experience has shown that the examination should be specialized, different groups of apparatus always being dealt with by the same workmen. Careful charts of these inspections are prepared and afterwards examined daily by the foreman, so as to prevent any portion of a car not being dealt with at the proper period.

OPERATING COSTS.

Some details as to the cost of operation are given below, which will be useful when comparing the work done with that on other railways, whether slow moving electric trains or the older steam-trains are considered.

The very great difference in cost involved in the initial construction, and later, in the working of the generating plant and sub-stations by difference of location, by rates and taxes, cost of condensing water, and other important items which affect both the interest on capital outlay and the daily working expenditure, make it desirable to speak of "works cost" only, so that anyone familiar with the working of any other installation can add their figures for all items of general charges, and arrive at an approximate comparison.

On this basis it may be said that any railway company having the opportunity of putting down its own plant in the country with ample facilities for getting cheap coal and water should be able to produce current at the generating stations at a "works cost" of less than 0.25 of a penny per B.t.u., the coal consumption being under 3 lbs. per a.c. unit.

With such figures as these, it is possible to work a high speed service such as I have indicated at 9.5*d.* (19 cents) per train-mile, including "works costs" for the power-house, sub-stations, battery stations, "operating costs" for motor and electrical equipment repairs, car repairs, guards' and motormen's wages, lighting and heating of cars, repairs of third and fourth rails, bonds and cables, and all working stores. The cost per car-mile varies between 2.75*d.* (5½ cents) and 3*d.* (6 cents), according to the number of cars run. The total current producing charges, including conversion at sub-station, the cost of battery stations, and depreciation of batteries, absorbs 4.52*d.* (9.04 cents) out of the 9.5*d.* (19 cents) per train-mile. With the exception of the depreciation of batteries, no sum is included for depreciation of plant, or for interest on outlay. The above figures are not intended to, and do not include any part of the cost of maintaining the running track, the passenger and goods stations, or costs for the platform staff, or any other items required for the railway, whether worked as a steam line or as an electric line. It follows that if track maintenance becomes more expensive, for reasons referred to elsewhere any increase will have to be put down to electrical working and must be added to the above figure. The great economy to be hoped for in the future for electrical railways, where no water power is available, is in the production of electricity in very large quantities, the total current producing charges indicated above forming so large a proportion of the total operating cost. The other directions in which economies may be sought for in future designs are mainly in such improvements in the motors as will lead to less repairs, and a very careful consideration of the whole design of the motor truck, with a view to giving those large bearing sur-

faces at every point where the locomotive experiences of many years have shown them to be necessary.

It should be remembered that steam-worked suburban trains are generally hauled with one tank engine. Electric trains of the weights I have spoken of have at least two motor-cars, one in front and one in the rear. The first cost of the locomotive part of the motor-car (omitting the carriage), is about equal the cost of one locomotive. Therefore, the two motor-cars cost twice as much as one locomotive. The cost of the annual maintenance of one motor-car is more than the cost of maintaining a locomotive, But the average miles run per annum per locomotive are 20,000, whereas the electric motor-car will run 50,000. The general result is that the cost per train-mile run becomes less for the electric motor-car, and less again per motor-car mile, if each motor-car is looked upon as a separate locomotive.

Brake gear is an expensive item, the continual stopping causing rapid wear of all pins and brake blocks, which, combined with the dust and dirt of the road, all help to increase the cost, and therefore to make one hope for the time when some form of regenerative control, which will be of a simple character not involving the carrying of extra weights and a complete change of equipment, will be produced by our electrical brethren.

Those items, which may be put down as giving no trouble whatever are: controllers, commutators, steel spur-gearing, and the third rail. The latter is easy to lay, cheap to maintain, and has proved by long experience to be the cause of very few accidents.

EFFECT OF HIGH SPEEDS ON OPERATION AND COSTS.

The steam services in operation previous to conversion ran to the following schedules:

Class of train.....	Stopping.*	Stopping.	Express.
Running bet. Liverpool and..	Hall Road.	Southport.	Southport.
Total distance, miles	7⅛	18½	18½
No. of stops	8	14	1†
Av. distance of stations, miles.	0.89	1.32	..
Total time, minutes.....	25	55	25
Sched. speed, inc. stops, miles	17	20	44.5
Av. speed, not inc. stops, miles	20	23	..
Length of stop, seconds.....	30	30	..

*The steam service was between Liverpool and Crosby, but it is given between Liverpool and Hall Road to compare with the electric service given below.
†Birkdale.

The schedule for the stopping trains was increased considerably when electric traction was installed, but the express trains maintained the same service.

(1) For each schedule the train is accelerated at the same rate under ordinary service conditions.

(2) For the 30-m.p.h. schedule the brake is applied immediately after the power is switched off.

(3) For the 27.5 and 25-m.p.h. schedule a certain amount of coasting is done.

Electric Service.

Class of train	Stopping.	Stopping.	Express.
Running bet. Liverpool and...	Hall Road.	Southport.	Southport.
Total distance, miles	7⅛	18½	18½
No. of stops	8	14	1†
Av. distance of stations, miles	0.89	1.32	..
Total time, minutes	16	37	25
Sched. speed, inc. stops, miles.	26.75	30	44.5
Av. speed, not inc. stops, miles	30	33	..
Length of stop, seconds.....	15	15	..

The curves for acceleration, coasting and retardation are based upon actual figures obtained in tests, and from these time-speed curves have been constructed for the three schedules with stations 1, 2 and 3 miles apart, and trains ranging from 2 to 7 cars, the slower schedules being obtained by more or less coasting.

The following table shows the chief comparisons between the various schedules. From this table it will be seen that the percentage drop in emergency consumption is approximately the same for any size of train from 2 to 7 cars in each of the cases taken. The averages are given in the last section.

Stations 1 Mile Apart.

Schedule including stops, m.p.h.	Average speed, excluding stops, m.p.h.	Number of cars.* 2.	3.	4.	5.	6.	7.
		Percentage watt-hrs. per ton-mile.					
30.0	33.0	100.0	100.0	100.0	100.0	100.0	100.0
27.5	30.0	67.2	68.8	70.5	71.8	73.3	75.2
25.0	27.0	44.8	46.3	47.4	49.2	50.8	53.1
		Stations 2 Miles Apart.					
30.0	33.0	100.0	100.0	100.0	100.0	100.0	100.0
27.5	30.0	68.0	67.0	66.5	65.5	65.5	65.5
25.0	27.0	49.2	48.5	47.7	47.5	47.4	48.6
		Stations 3 Miles Apart.					
30.0	33.0	100.0	100.0	100.0	100.0	100.0	100.0
27.5	30.0	72.6	72.7	72.6	72.8	73.4	74.0
25.0	27.0	56.5	55.1	54.5	54.0	54.4	55.1

Averages of the Above.

Schedule including stops.	Distance between stations— 1 mile.	2 miles.	3 miles.
	Percentage watt-hours per ton-mile.		
30.0	100.0	100.0	100.0
27.5	71.1	66.3	73.0
25.0	48.6	48.15	54.9

*Two motor cars used in each case.

This table points out very clearly the great effect that any increase in the schedule has on the energy, or what is the same thing, the coal consumption.

A high schedule speed necessitates a high acceleration, and this has an effect on the cost of maintenance of the motors. Other things being equal the current through the motors will be proportional to the acceleration, and therefore to the schedule; but the heating effect of this current varies as its square, and since there is no coasting the motors have very little time in which to cool down. This heating acts detrimentally on the insulation of the motor and decreases its life.

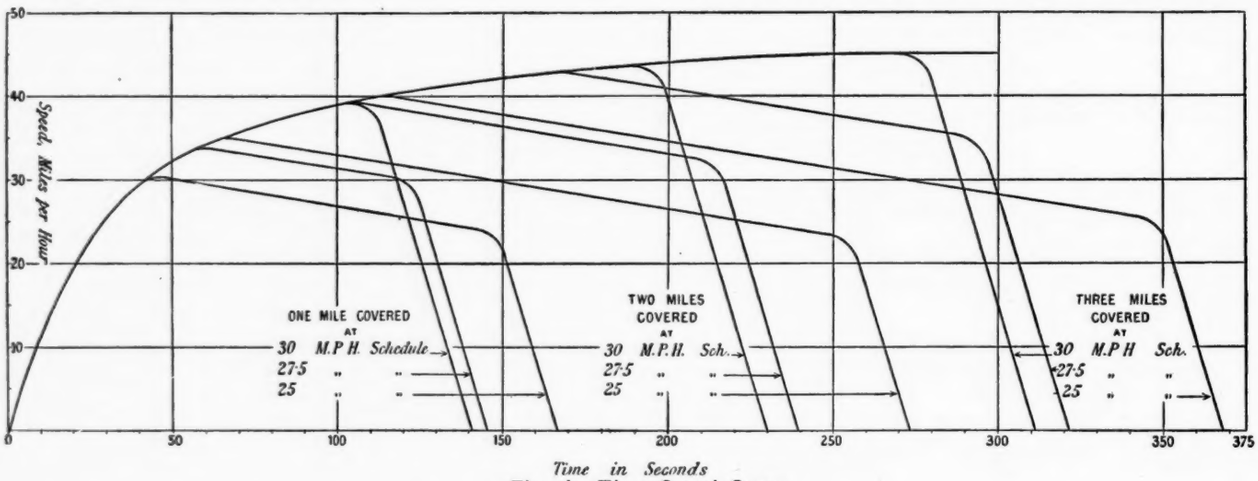


Fig. 4—Time Speed Curve.

In making comparisons between steam and electric traction for coal consumption per ton-mile any increase in the schedule speed should be taken into consideration. With a view of showing the effect of speed on electric services, a series of curves, shown on Fig. 3 has been worked out for schedules of 30, 27.5 and 25 m.p.h. respectively.

The following points have been assumed in working out the speed time curves (Fig. 3) for the various schedules:

(To be continued.)

General News Section.

The thirteenth international conference of Railroad Young Men's Christian Associations will be held in St. Louis on May 27-30.

The New York legislature has passed a law regulating the hours and conditions of labor of men working in tunnels and caissons where compressed air has to be breathed.

An officer of the Pullman Company says that during the year ended July 31, 1908, the number of passengers carried in standard Pullman sleeping cars was 18,603,067, and that only one of these was killed.

The Wisconsin Railway Commission has announced that the total valuation of railways in Wisconsin for 1909 is $274,948,000 as against $267,861,500 in 1908. The tax is at the rate of 1.143084076 cents on the dollar and amounts to $3,142,887.

Representative Wanger, of Pennsylvania, a member of the Committee on Interstate and Foreign Commerce, has introduced in Congress a bill to forbid railways to own stock or securities in any business enterprise, such as a coal mine, which ships freight over its line.

At Fort Wayne, Ind., one day last week a foreman and 21 men in the freight house of the Pennsylvania Company were overcome by fumes of bromide gas from a box which was found to be smoking, and which the men tried to remove. All of the men had to be sent to the hospital.

The railroad commission of Indiana, acting under the law requiring all railway trains to be equipped with surgical cases, has made an order requiring that all passenger and freight trains be equipped with such cases, containing material for first aid to the injured, within 90 days from the entry of the order.

The city councils of Baltimore, engaged in a strenuous endeavor to abolish smoke in the railway tunnels of that city, held a hearing this week to investigate the subject; but representatives of the Pennsylvania declare that to install electric power in the tunnels would cost $6,000,000; and to operate trains in that way would cost $486,000 a year, an expense which could not be borne.

In regard to the reports concerning the further electrification of the New York, New Haven & Hartford, it is announced that preliminary estimates have been submitted to the Board of Directors, but that it is unlikely that any definite action will be taken or authority granted for some time. The estimates were for the electrification of the main line from Stamford, Conn., the present terminus of electric operation, to New Haven.

Vice-President Byrnes, of the New York, New Haven & Hartford, has announced that that company contemplates running through passenger trains in the summer between New York City and Cape Cod, by way of Providence, Fall River and New Bedford. The necessary connections at Providence can readily be made, as the tunnel through that city is now finished; but at Fall River the two divisions of the road are separated by a hill which would have to be pierced with a tunnel.

The committee of the national association of railroad commissioners, F. K. Lane, chairman, has drafted a code of demurrage reules designed to be applicable alike on intrastate and interstate transportation and will give a public hearing on June 4 and 5, at Washington. The object of this hearing is to give representatives of shippers as well as carriers an opportunity to be heard before final approval of the rules. Briefs will be received until June 12.

The Court of Appeals, the highest court of the State of New York, has affirmed a decision awarding heavy damages to a woman who was in an automobile who was injured by being struck by a locomotive at a grade crossing at Van Cortlandt Park, New York City, in June, 1904. The woman, who was so badly injured that one leg had to be amputated below the knee, receives $25,000 from the railway company, the original judgment having been reduced by the next higher court from $35,203, to the sum first named.

Chicago Railway Club.

The Chicago Railway Club had a meeting and dinner at the Grand Pacific Hotel on May 8, at which a permanent organization was effected by the election of the following officers: President, W. B. Barr (C. T. T); Vice-President, Bruce W. Duer (B. & O.); Secretary, E. L. Bevington (Transcontinental Passenger Association); Treasurer, C. Nyquist (C., R. I. & P.); Board of Directors, E. J. Skene (I. C.), E. J. Engel (S. F.), F. H. Tristman (Wabash), H. Deeming (G. M. Ass'n.), C. G. Hall (C. & N. W.), W. J. Leahy (C., R. I. & P.), F. H. Schneider (N. Y. C.), H. J. Cronin (C. & E. I.). Mr. Barr presided and Gardiner Lathrop, General Solicitor of the Atchison, Topeka & Santa Fe, spoke on "The Advantages of Co-operation Through the Means of a Club." Mr. Lathrop said that a club which brought together socially, and also for the purpose of discussion of their work, officers and employees of the different departments of the railways, would tend to broaden all of them and thereby increase the efficiency of the service. Touching upon the subject of government regulation of railways, he said that he had heard some railway men say that the government ought to let the railway business alone. He thought, however, that men who thus expressed themselves were mistaken. He believed that government regulation of the railway business has come to stay, and that in the long run this will be for the good of the railways as well as the public. He congratulated railway men on the fact that legislation and the enforcement of the laws was making it profitable for men in railway service to act right and lawfully and dangerous for them to act otherwise. He referred to the time when the railway traffic man was required to get business, even though he had to violate the law, and felicitated his hearers on the fact that that time was past. He urged railway officers and employees not only to strive to increase the efficiency of railway operation, but also to work together to raise the moral tone of the entire business. Samuel O. Dunn, Western Editorial Manager of the *Railroad Age Gazette*, also spoke briefly on the good that could be accomplished by the new club.

A proposition to furnish club rooms was received from the Grand Pacific Hotel, which is in most ways satisfactory to the directors, and probably will be accepted.

"Nickel Plate" Operating Rules.

The New York, Chicago & St. Louis has issued a revised book of rules for the transportation department, from which it appears that the company has adopted as standard a train order signal of semaphore type, with the arm moving in the upper quadrant. A vertical arm or a white light indicates clear; arm inclined 45 deg. upward or a green light, stop for train orders; arm horizontal or red light, absolute stop. The horizontal position is used to keep trains five minutes apart. The time interval, prescribed in rule 91, is five minutes.

Rule 10 prescribes the colors for signals (red for stop, green for caution, white for proceed), and also describes slow boards and regulates their use. A slow board is painted green and has on its face a number plate, which indicates the speed to which trains are limited. For example, "10" would indicate that the speed must be brought down to 10 miles an hour at a point 3,600 ft. distant. If the number cannot be seen, the speed must be reduced to six miles an hour. A "Resume speed board" indicates that full speed may be resumed when the rear car of the train has passed that board.

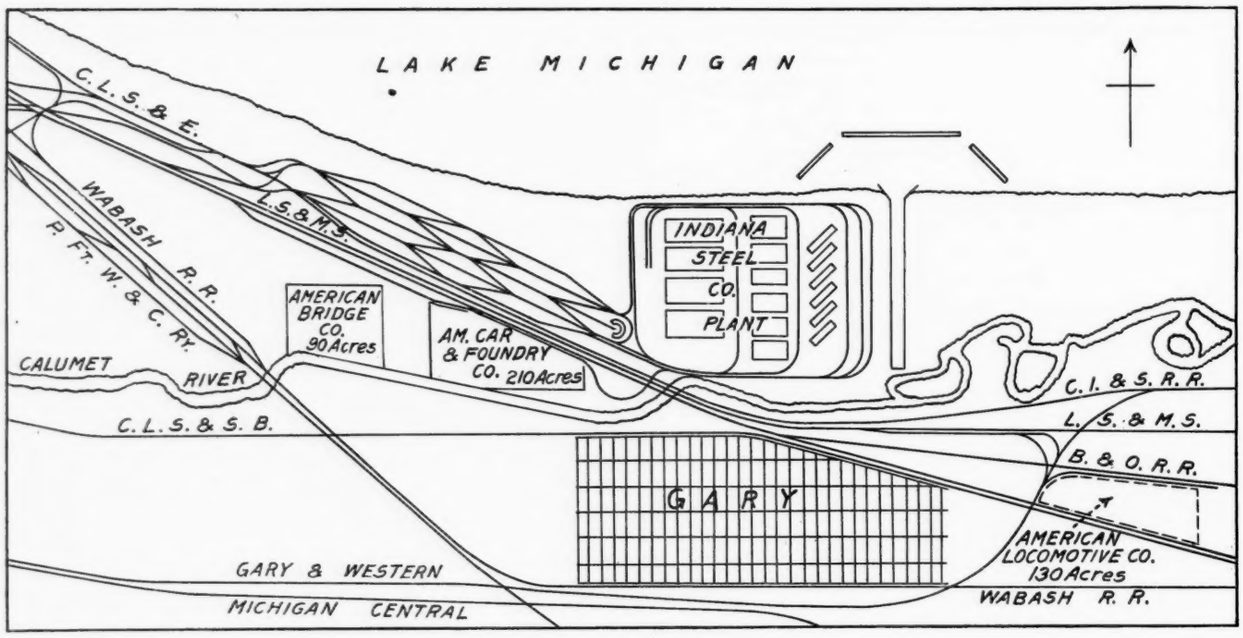
Rule 19 reminds enginemen that when engines are coupled to trains, the marker lamps on the engine must be extinguished—a rule which is needed on many roads. Under rule

83, trains detouring are required to report for orders at the telegraph office when returning to the home road. If there is no telegraph office at that point, instructions must be given to the train before it goes on to the foreign road.

Railway Equipment Plants at Gary.

On the recent inspection trip of the Maintenance of Way Association to Gary, Ind., the members were shown the sites of the proposed plants of the American Car & Foundry Co., New York, and the American Locomotive Co., New York. The location of these plants, as well as one for the plant of the American Bridge Co., New York, are shown on the accompanying plan in their relation to the Indiana Steel works, the town of Gary and the main lines of the Lake Shore, the Wabash and the Baltimore & Ohio.

The proposed plant of the American Car & Foundry Co. is located directly northwest from the town of Gary, with the Calumet river as its southern boundary and the freight classification yards of the Chicago, Lake Shore & Eastern and the Lake Shore main line on the north. This plant occupies 210 acres. Directly west is the site of the future plant of the American Bridge Co., occupying 90 acres. The proposed new plant of the American Locomotive Co. will be located


LAKE MICHIGAN
C. L. S. & E.
WABASH R. R.
P. FT. W. & C. RY.
L. S. & M. S.
INDIANA STEEL CO. PLANT
AMERICAN BRIDGE CO. 90 Acres
AM. CAR & FOUNDRY CO. 210 Acres
CALUMET RIVER
C. L. S. & S. B.
C. I. & S. R. R.
L. S. & M. S.
B. & O. R. R.
GARY
AMERICAN LOCOMOTIVE CO. 130 Acres
GARY & WESTERN
MICHIGAN CENTRAL
WABASH R. R.

Railway Equipment Plants at Gary.

along the east line of the corporate limits of the town of Gary and south of the Baltimore & Ohio and the Lake Shore main lines, the tract comprising 130 acres.

The map shows also the new location of these lines, as well as that of the Chicago, Indiana & Southern. When the plans of the Indiana Steel works were completed it was found that the mills would require about 1,000 acres in one compact body. This required the entire removal of the Baltimore & Ohio and the Chicago, Indiana & Southern, as they ran diagonally across part of the site. These lines were moved south and are now located between the Indiana Steel works and the town of Gary. They are elevated at this point so as to eliminate the grade crossing of the main street, Broadway, which is the principal avenue of communication between the town and the works.

Special Train to the Mechanical Conventions at Atlantic City.

The Pennsylvania Lines will run a train, to be known as the "M. M. Special," from Chicago to Atlantic City for the accommodation of members of the American Railway Master Mechanics' Association and the Master Car Builders' Association and their friends going to the annual conventions of these organizations. This train will leave Chicago at 5.30 p. m. on Monday, June 14, and will arrive at Atlantic City at about 5 p.m. of the following day. It will be composed of Pullman sleepers, observation car, library smoker and two dining cars. The fare will be $26 for the round trip. Tickets will be on sale from June 1, with a 30-day return limit, and will allow stop-overs at Philadelphia, Washington, Baltimore and Pittsburgh returning. Those who desire to take advantage of the privilege of stopping at Washington or Baltimore will have to so state at the time of buying tickets. Diagrams for this train are now in the office of the City Ticket Agent at 248 South Clark street, Chicago, and reservations may be secured by applying to the City Ticket Agent or to G. G. Beltzhoover, District Passenger Agent; F. O. Birney, Local Passenger Agent, or T. R. Wilt, City Passenger Agent.

Association of American Railway Accounting Officers.

The annual meeting of the Association of American Railway Accounting Officers was held at Cincinnati, Ohio, on April 28, 29 and 30. The principal report made was that of the standing committee on Corporate, Fiscal and General Accounts. This committee had been in touch with Prof. Henry C. Adams, of the Interstate Commerce Commission, for a year, and presented a form of balance sheet and a text therefor and a form of classification for additions and betterments and a text therefor. No formal action was taken by the association on this report, as it had been submitted to the executive officers of the various railways for their consideration. The standing committees on freight and passenger accounts made lengthy reports, which, in the main, were adopted as presented. Prof. Henry C. Adams addressed the convention on the subject of the Relation of Uniform Accounting to Government Regulation of Railways.

Over 250 members were in attendance. The next meeting will be held at Colorado Springs, Colo., beginning the last Wednesday in June, 1910. The following officers were elected for the ensuing year:

President, C. F. Krebs, Comptroller, Illinois Central.

First Vice-President, W. E. Bailey, General Auditor, Atchison, Topeka & Santa Fe.

Second Vice-President, L. A. Jones, Vice-President and Comptroller, New Orleans & Northeastern.

Secretary, C. G. Phillips, Tribune building, Chicago.

The executive committee is made up as follows: Terms expiring in 1910, G. N. Wilson (Lehigh Valley), M. P. Blauvelt (Erie), W. J. Healy (A., T. & S. F.) and H. J. Stirling (U. P.); terms expiring in 1911, J. G. Drew (G. N.), E. A. Stockton (Pennsylvania), M. F. Molloy (C., N. O. & T. P.) and R. A. White (N. Y. C. & H. R.).

American Street and Interurban Railway Association.

The annual convention of this association and those affiliated with it will be held at Denver, Colo., on October 18, 19, 20, 21 and 22, 1909. The days upon which the different associations will hold their meetings have not been definitely decided. Since the western membership of the association represents about 20 per cent. of the total, and these western companies have been most generous in their attendance at the eastern conventions, it was decided that the welfare of the association could best be served and the western companies given the consideration which is their due by holding the 1909 convention in some city west of the Mississippi river.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York; second Friday in month; New York.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York, May 19, 1909; New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 16-18, 1909; Atlantic City.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St.; N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N. Y.; 2d Tues. in month; annual, Dec. 7-10; New York.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St.; New York; Oct. 18-22; Denver, Colo.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; June, 1910; Colorado Sp'gs.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.; May 26-28, 1909; Detroit, Mich.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago, June 23-25, 1909; Detroit.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Pl., New York; June 22-23; Montreal.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; irregular, usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Richmond, Va.; June 16, 1909; Old Point Comfort, Va.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago, June 21-23, 1909; Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago; June 1-5; Chicago.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago; June 21-23, 1909; Atlantic City.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug., and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, Aug.; St. Paul and Minn.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.; June 8, New York.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C., Collinwood, Ohio; May 17-19; Chicago.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago; Sept. 7-8; Fort William Henry, Lake George, N. Y.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R, East Buffalo, N. Y.; September, 1909; Denver.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St., Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago, 1st Wednesday, except July and August; Chicago.

Traffic News.

The Governor of Pennsylvania has signed the bills which were passed by the last legislature allowing the subway and the surface street railways in Philadelphia to carry freight at night.

It is announced in New Orleans that the Southern Steamship Co. will, on June 1, begin semi-monthly sailings between that city and Philadelphia. The reports say that the Southern Pacific Company is interested in this new line.

The lines west of Chicago have decided after considerable discussion of the subject to discontinue the checking of baggage to or from residences and hotels. The number of people who took advantage of the accommodation was so small that it caused the roads more trouble than it was worth.

The Baltimore & Ohio Southwestern, it is reported, has announced that it will reduce the rate on coal from all points as far west as Zaleski, Ohio, to Athens, from 40 cents to 35 cents a ton. It is said that this reduction is largely due to a threat of the coal operators to take the question of coal rates before the Ohio Commission unless some change was made.

A permit to operate in Texas was granted on May 7 by the Secretary of State to the Pullman Company, on the payment of a franchise tax of $10,000 and the execution of an affidavit that it is not a party to any trust. This is the first time that the Pullman Company has obtained a permit to operate in Texas, and, owing to past differences between it and state officials, proceedings are now pending against it to oust it from the state.

The Southern Engineering & Electric Company has brought suit at Little Rock, Ark., against the St. Louis, Iron Mountain & Southern for damages amounting to $48,225 for alleged discrimination against it in freight rates. It states that it bought a lease of a stone quarry and rock crusher near Argenta, Ark., and began business on May 15, 1908; that the railway charged it $5 to $10 a car for hauling its rock to Little Rock, while it made a rate to the Big Rock Stone & Construction Company for a slightly longer distance of $3.50 a car, and that owing to this discrimination the complaining concern was finally compelled to sell out and quit business.

The Pennsylvania Railroad has instructed its division freight agents to communicate with the banks in their respective districts with a view to persuading the officers of these banks to decline to accept bills of lading not properly endorsed; this with a view to meeting the complaint of the banks that "order" bills of lading ought to be made in a form more to their liking. The company also has issued to its agents elaborate and detailed instructions as to the exact methods of preparing bills of lading which may be issued for banking collateral. The banks assert that large sums of money are every year lost through the acceptance of bills of lading which are defective either in form or endorsement; but the remedy, or at least an important element of the remedy, is for the bankers themselves to realize the importance of insisting that bills of lading shall have thrown around them the safeguards common to reliable commercial paper. Bankers everywhere frequently negotiate all kinds of unconventional instruments which are supposed to be bills of lading, but the irregularity of which is apparent to the careful observer. Of course a carrier cannot deliver freight on the basis of imperfectly prepared and endorsed documents, and so deliveries are liable to be delayed and consignees subjected to serious hardships. So defective are some of these documents that it is often necessary to return them to the shipping point for correction before the carrier can deliver the property which they represent. An officer of the Pennsylvania declares that practically all of these losses to banks have been the result of imperfections in the bills of lading accepted as collateral; and he says, rightly, that if bankers, in handling bills of lading, would exact the same conventionalities which are provided by statute and by custom for the protection of commercial paper the situation would be at once improved.

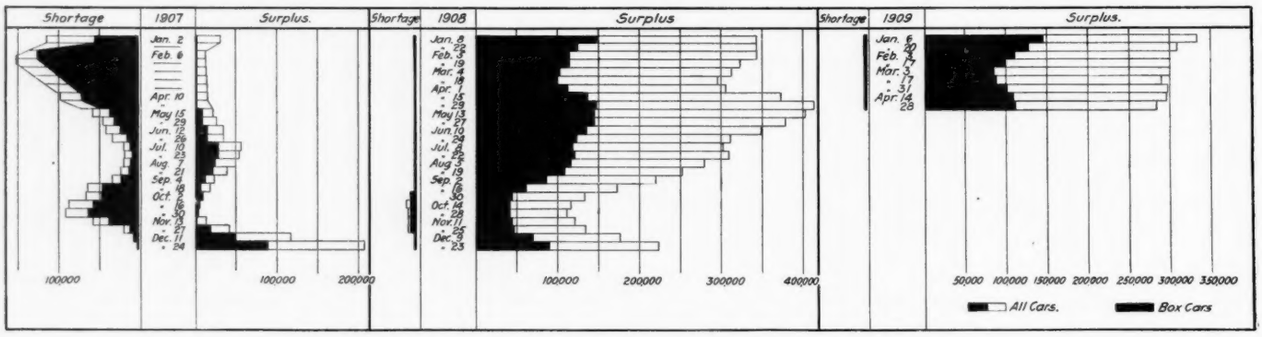
Car Surpluses and Shortages.

Arthur Hale, Chairman of the Committee on Car Efficiency of the American Railway Association, in presenting bulletin No. 45-A, giving a summary of car surpluses and shortages by groups from February 19, 1908, to April 25, 1909, says:

CAR SURPLUSES AND SHORTAGES, FEBRUARY 19, 1908, TO APRIL 28, 1909, INCLUSIVE.

		Surpluses.					Shortages				
	Number of roads.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
April 28, 1909	161	107,665	16,487	110,538	47,638	282,328	144	106	74	173	497
April 14, 1909	163	108,291	17,692	122,982	47,698	296,663	80	135	109	19	343
March 31, 1909	158	101,344	20,428	128,546	46,282	296,600	158	98	116	27	399
March 17, 1909	161	88,459	20,328	139,997	42,634	291,418	310	74	27	139	550
February 17, 1909	159	98,512	23,924	135,208	43,797	301,441	266	97	11	96	470
February 3, 1909	165	110,632	26,121	122,711	42,107	301,571	97	31	49	111	288
January 20, 1909	162	127,204	26,723	116,680	41,057	311,664	163	21	139	35	358
December 23, 1908	158	87,350	16,247	79,595	38,885	222,077	471	42	289	217	1,019
November 25, 1908	160	45,194	12,157	43,854	31,624	132,829	7,923	178	900	209	9,210
October 28, 1908	158	39,383	10,185	31,541	29,803	110,912	8,175	167	2,261	236	10,839
September 30, 1908	160	42,593	10,365	49,795	31,039	133,792	7,313	450	224	127	8,114
August 19, 1908	160	106,367	13,494	92,500	40,642	253,003	465	90	105	194	854
July 22, 1908	166	120,580	14,401	125,739	47,960	308,680	115	37	330	27	509
June 24, 1908	163	123,112	18,042	130,149	41,995	313,298	266	34	120	31	451
May 27, 1908	160	144,697	20,075	162,695	54,437	381,904	82	13	12	18	125
April 29, 1908	159	147,971	24,350	186,742	59,542	413,605	145	42	16	64	267
March 18, 1908	160	103,509	25,122	119,205	49,206	297,042	533	151	250	73	1,007
February 19, 1908	161	113,776	30,088	134,217	44,432	322,513	697	141	249	162	1,249

"This report shows a reduction in the surplus of 14,335 cars, bringing the total down to 282,328. The principal part of this decrease is in coal and gondola cars, the surplus of which is now reduced to 110,538, a decrease of 12,444 since our last report. The decrease in box amounts to only 626 cars. The largest decreases are in groups 4 (North Atlantic) and 6 (Northwestern). There are increases in groups 5 (Southern), 7 (Montana, etc.), and 10 (Pacific)."



Car Surpluses and Shortages in 1907, 1908 and 1909.

Condition of the Wheat Crop.

The crop reporting board of the department of agriculture estimates that on May 1 the area of winter wheat to be harvested was about 27,871,000 acres, or 2,478,000 acres (8.1 per cent.) less than the area harvested in 1908, and 2,163,000 acres (7.2 per cent.) less than the area sown last fall (30,034,000 acres, which includes 150,000 acres of winter wheat sown in Montana, not included in the December estimate).

The average condition of winter wheat on May 1 was 83.5 compared with 82.2 on April 1, 89.0 on May 1, 1908, and 86.0, the average for the past ten years on May 1.

The average condition of rye on May 1 was 88.1, compared with 87.2 on April 1, 90.3 on May 1, 1908, and 89.1 the average for the past ten years on May 1.

Traffic Club of St. Louis.

The Traffic Club of St. Louis gave a dinner at the Jefferson Hotel, St. Louis, on Tuesday evening, May 4. George J. Tansey, President of the St. Louis Transfer Company, was the toastmaster. The speakers were Judge Smith McPherson, of the United States Circuit Court; Frederick W. Lehman, a prominent lawyer of St. Louis, and Isaac N. Lionberger, former Assistant Attorney-General of the United States.

The speech of Judge McPherson was notable because of the position taken by him that justice to the railways and the public good require that regulation of railways shall ultimately be exercised solely by the federal government.

Mr. Lehman defended judicial restraint, which is "a check on the public whim." Capricious, injurious, violent sentiment, he said, is formed by seekers for public office "who do not say what they think, but what they think other people think." He criticized Congressman Murphy, of Missouri, for attacking Judge McPherson for his decision in the Missouri rate case. Referring to railway regulation, Mr. Lehman said that if the railways would take his advice "they would send to the state capitals to inform the legislatures the same kind of men who manage the roads and would call back the sort of men who cannot face a jury with courage." Mr. Lionberger also vigorously defended Judge McPherson and cautioned the public to pay proper respect to the courts, both federal and state. The club adopted a resolution declaring its "respect for and confidence in our state and federal courts, and in the courage, fairness and integrity of the judiciary; deploring the tendency exhibited in some quarters to seek the attainment of personal or official ends through criticism of the courts rather than by resort to the established form of judicial procedure."

California Demurrage Rules.

A press despatch of May 11 says that the Governor of California has signed the "reciprocal demurrage act" and that it becomes effective June 17. After that date the railways will be fined $5 a day for each day's delay on each car ordered by shippers. When 10 cars are ordered five days will be allowed for delivery and 15 days for 50 cars. To protect railways against irresponsible orders, the shipper is required to deposit with the agent one-fourth of the freight charges in advance. The railways are liable to the shipper for any actual damage caused by delay in furnishing cars. On the other hand, if the shipper does not load the cars within 48 hours of the time they are furnished, he is liable to the railway company for $6 a day [?] demurrage.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MARCH, 1909.
(See also issue of May 7, 1909.)

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Atchison, Topeka & Santa Fe	7,549	$4,852,140	$1,548,975	$6,931,517	$842,203	$863,273	$125,638	$1,844,693	$132,386	$3,808,193	$3,123,324	.....	$231,472	$2,891,852	$344,259
Atlantic Coast Line	4,468	1,966,413	602,758	2,764,669	314,244	300,062	37,681	793,367	67,467	1,512,821	1,251,848	.....	90,000	1,161,848	376,325
Baltimore & Ohio	3,992	4,422,333	1,085,882	5,854,441	736,774	959,647	134,958	2,057,964	130,754	4,020,097	1,834,344	$42,897*	160,090	1,631,357	644,838
Boston & Maine	2,242	2,091,610	965,283	3,295,678	273,752	471,763	38,161	1,678,221	89,806	2,551,703	743,975	2,470	153,023	593,422	178,502
Central of Georgia	1,916	734,586	194,159	1,010,380	139,817	197,848	26,762	293,438	37,773	695,638	314,742	4,576	45,697	263,621	15,315
Central of New Jersey	668	1,652,440	316,636	2,082,518	156,684	307,694	25,273	528,320	40,616	1,058,587	1,023,931	11,823*	46,626	965,482	627,339
Chicago & Alton	998	693,026	274,335	1,060,119	98,986	126,340	42,631	359,486	29,766	657,209	402,910	1,094*	30,000	371,816	†87,106
Chicago, Milwaukee & St. Paul	7,516	3,766,116	934,708	5,064,982	387,292	582,274	109,970	1,781,165	90,173	2,950,874	2,114,108	8,449	206,638	1,915,919	342,264
Chicago, Rock Island & Pacific	7,414	3,242,237	1,256,397	4,783,796	604,561	619,561	119,628	1,914,313	129,218	3,387,276	1,396,520	13,115*	171,075	1,212,330	135,800
Cleveland, Cincinnati, Chic. & St. L.	1,982	1,483,612	506,286	2,186,121	249,831	408,729	68,246	858,684	42,903	1,628,393	557,728	6,284*	74,000	477,444	153,853
Delaware & Hudson	845	1,332,349	161,877	1,540,813	111,964	218,729	14,365	600,734	74,038	1,019,830	520,983	617*	35,000	485,366	†31,031
Denver & Rio Grande	2,516	1,281,699	322,701	1,676,302	182,640	317,558	39,555	646,515	42,682	1,228,950	447,352	1,801	65,000	384,153	†22,045
Erie	1,901	2,940,046	612,423	3,805,455	228,991	692,508	82,402	1,246,485	73,372	2,323,758	1,481,697	11,490*	105,994	1,364,213	688,571
Great Northern	6,961	2,951,313	805,604	3,996,094	508,105	465,176	63,124	1,222,990	79,059	2,338,454	1,657,640	7,329	220,814	1,444,156	693,696
Illinois Central	4,518	3,211,030	848,617	4,660,543	417,474	1,056,072	97,741	1,589,670	91,498	3,252,455	1,408,088	1,803*	189,224	1,217,061	79,567
Lake Shire & Michigan Southern	1,511	2,385,665	689,694	3,485,236	370,552	587,246	68,036	1,136,530	66,014	2,228,378	1,256,858	7,214*	125,000	1,124,644	164,308
Louisville & Nashville	4,388	2,861,212	802,191	3,907,398	450,440	686,871	86,702	1,242,958	74,443	2,541,414	1,365,984	9,369	112,700	1,262,653	411,458
Maine Central	931	501,733	184,198	728,671	64,855	108,917	6,548	271,406	20,963	472,689	255,982	1,890	31,962	225,910	67,635
Michigan Central	1,746	1,630,971	431,615	2,259,011	246,301	346,180	58,722	889,216	36,484	1,576,903	682,108	9,808*	94,000	578,300	88,455
Minneapolis, St. Paul & S. Ste. Marie	2,395	738,221	209,582	990,563	85,718	111,458	15,635	316,560	24,727	554,098	436,465	13,922	71,541	378,846	124,619
Nashville, Chatt. & St. Louis	1,230	749,439	177,237	992,970	167,811	163,705	37,442	344,202	23,178	736,338	256,632	.....	20,668	235,964	48,656
New York, Chicago & St. Louis	556	747,175	86,396	860,856	111,416	113,981	38,441	340,148	12,755	616,741	244,115	1,557*	26,000	216,558	†1,745
New York N. H. & Hartford	1,998	2,385,089	1,744,098	4,532,941	393,548	558,125	29,960	1,941,883	97,943	3,021,459	1,511,482	95,532	305,000	1,302,014	349,512
Oregon R.R. & Nav. Co.	1,327	699,876	238,257	999,486	107,372	77,850	27,059	293,613	27,688	533,582	465,904	355*	68,985	396,564	8,581
Oregon Short Line	1,456	1,069,773	289,253	1,445,359	79,629	167,663	19,198	290,041	32,228	588,760	856,600	1,597*	50,000	805,003	306,571
Pensylvania Co.	1,416	2,378,949	522,450	3,188,135	422,008	586,483	62,377	1,188,511	68,294	2,327,673	860,462	3,881*	149,900	706,680	†4,658
Pere Marquette	2,362	986,644	236,834	1,306,245	126,203	189,125	29,097	534,208	31,121	909,754	396,491	4,985*	46,265	345,241	151,128
Philadelphia & Reading	1,006	3,039,717	457,726	3,643,179	266,627	613,231	33,542	1,049,617	55,980	2,018,997	1,624,182	45,554	60,867	1,608,869	613,012
Pittsburgh, Cin., Chic. & St. Louis	1,472	1,962,476	530,802	2,806,434	352,287	553,325	58,567	990,239	56,913	2,011,331	795,103	172*	114,000	680,931	†40,645
St. Louis & San Francisco	4,727	2,102,412	700,296	3,052,888	267,162	234,193	77,156	996,079	90,597	1,665,187	1,387,701	.....	120,781	1,266,920	376,863
Seaboard Air Line	2,613	1,152,320	355,169	1,658,369	201,966	222,103	48,868	522,521	44,211	1,039,669	618,700	510*	54,053	564,137	188,288
Texas & Pacific	1,885	782,597	297,939	1,147,423	198,869	211,820	16,331	522,336	35,897	985,253	162,170	964*	41,648	119,558	22,858
Union Pacific	3,310	2,634,464	667,843	3,606,243	226,361	423,554	98,312	939,528	96,994	1,784,749	1,821,494	5,030*	111,783	1,704,681	377,382
Vandalia	829	487,344	166,430	741,216	99,265	133,721	21,564	287,283	17,421	559,254	181,962	.....	24,365	157,597	†17,222
Wabash	2,515	1,519,958	449,610	2,149,660	268,320	342,826	71,810	835,385	66,693	1,585,034	564,626	3,362*	68,215	493,049	195,221
Yazoo & Mississippi Valley	1,371	601,918	144,508	792,318	152,260	166,312	14,996	291,400	24,001	648,969	143,349	1,626	30,835	114,140	†47,807
NINE MONTHS OF FISCAL YEAR.															
Atchison, Topeka & Santa Fe	7,549	38,597,224	13,800,648	56,845,647	7,198,832	8,805,388	1,163,712	15,415,599	1,191,777	33,775,308	23,070,339	.....	1,858,677	21,211,662	3,101,755
Atlantic Coast Line	4,468	13,781,610	4,442,395	19,647,859	2,640,715	2,716,362	322,219	6,344,728	553,033	12,587,057	7,060,802	.....	810,000	6,250,802	1,781,450
Baltimore & Ohio	3,992	40,304,150	9,714,156	53,138,448	6,412,134	8,044,533	1,185,565	18,534,634	1,105,253	3,528,119	17,856,329	408,250*	1,533,207	15,914,872	1,882,421
Boston & Maine	2,242	17,105,983	10,149,323	29,497,866	3,303,702	3,426,539	350,877	13,488,606	701,139	21,270,864	8,227,002	80,681	1,324,492	6,983,191	610,006
Central of Georgia	1,916	5,976,273	2,102,436	8,833,503	1,198,219	1,625,429	237,064	2,694,840	328,423	6,083,975	2,749,528	44,880	363,258	2,431,150	282,427
Central of New Jersey	668	12,353,491	3,171,014	16,423,653	1,564,186	2,750,415	227,595	4,463,996	337,708	9,343,900	7,079,753	230,242	748,017	6,561,978	67,680
Chicago & Alton	998	5,957,628	2,912,290	9,654,524	895,434	1,087,094	354,398	3,099,422	272,480	5,708,829	3,945,695	8,809*	270,000	3,666,886	585,326
Chicago, Milwaukee & St. Paul	7,516	32,572,341	9,675,575	45,813,300	5,201,638	5,583,894	980,632	16,448,732	805,053	29,019,949	16,793,351	156,472	1,808,775	15,141,048	477,225
Chicago, Rock Island & Pacific	7,414	28,102,090	12,790,901	43,532,121	6,529,376	5,634,962	1,013,469	16,343,390	1,151,587	30,672,784	12,859,337	102,041*	1,627,639	11,129,657	573,885
Cleveland, Cincinnati, Chic. & St. L.	1,982	12,494,391	5,194,604	19,537,699	2,094,656	3,500,761	626,313	7,807,302	395,434	14,424,466	5,113,233	31,913*	633,347	4,447,973	472,151
Delaware & Hudson	845	11,374,394	2,099,425	13,904,585	992,679	1,557,217	163,415	4,998,416	354,490	8,066,217	5,838,368	1,039*	311,749	5,525,580	†649,978
Denver & Rio Grande	2,516	11,229,280	3,615,722	15,544,999	1,730,063	2,650,262	342,989	5,469,991	456,896	10,650,201	4,894,998	36,070	584,750	4,346,118	†878,568
Erie	1,901	24,028,392	6,087,653	32,402,506	3,070,352	6,473,710	712,937	11,119,440	688,429	22,064,869	10,337,637	213,424	906,683	9,644,379	3,288,937
Great Northern	6,961	30,266,778	8,104,900	40,743,788	6,804,589	4,951,717	528,976	11,221,824	752,032	24,259,139	16,484,649	161,588	1,902,762	14,743,475	352,577
Illinois Central	4,518	27,565,496	8,276,588	40,951,008	4,623,324	9,108,317	878,471	14,063,542	859,209	29,532,863	11,418,145	23,864*	1,687,849	9,706,432	280,099
Lake Shire & Michigan Southern	1,511	20,048,117	7,133,293	31,027,829	3,500,175	4,636,622	740,339	9,969,023	522,463	19,368,622	11,659,207	26,907*	1,148,647	10,483,653	478,492
Louisville & Nashville	4,388	24,822,568	7,667,457	34,630,638	3,850,173	6,073,315	752,797	11,074,122	706,821	22,457,228	12,173,410	81,226*	1,012,125	11,080,059	3,719,786
Maine Central	931	3,719,301	2,113,275	6,244,691	905,297	879,380	65,030	2,273,682	200,582	4,323,971	1,920,720	21,316	281,110	1,660,926	†176,117
Michigan Central	1,746	12,582,237	4,700,181	18,949,109	2,187,955	2,681,430	535,961	7,356,197	314,851	13,076,394	5,872,715	44,961*	847,694	4,980,060	†447,521
Minneapolis, St. Paul & S. Ste. Marie	2,395	6,605,780	2,211,297	9,257,812	902,241	1,025,552	172,091	2,866,303	204,749	5,170,937	4,086,875	215,545	662,450	3,639,970	769,838
Nashville, Chatt. & St. Louis	1,230	5,957,013	1,889,688	8,420,453	1,260,290	1,533,281	309,063	2,994,210	208,532	6,305,377	2,115,076	6,653*	181,336	1,927,087	124,553
New York, Chicago & St. Louis	556	5,685,852	1,055,356	6,969,727	697,283	755,137	385,962	2,854,590	117,734	4,810,706	2,159,021	10,516*	263,510	1,884,994	†343,379
New York N. H. & Hartford	1,998	19,432,238	17,020,123	40,066,126	4,660,642	4,781,536	218,279	16,916,719	837,828	27,415,004	12,651,123	915,190	2,612,000	10,954,313	986,961
Oregon R.R. & Nav. Co.	1,327	6,583,591	2,509,743	9,658,841	967,530	656,683	201,860	2,644,196	260,825	4,731,094	4,928,747	22,740*	473,352	4,432,655	†476,783
Oregon Short Line	1,456	9,395,959	2,949,398	13,132,932	1,108,986	1,251,166	165,933	2,534,600	269,421	5,330,106	7,802,826	1,472*	448,048	7,353,306	1,561,362
Pensylvania Co.	1,416	22,703,239	5,036,761	30,424,461	3,023,315	4,968,422	555,589	10,560,823	637,320	19,745,469	10,678,992	26,212*	1,365,698	9,287,082	30,148
Pere Marquette	2,362	7,261,786	2,559,537	10,639,764	1,238,154	1,569,949	242,000	4,272,990	267,874	7,590,967	3,048,797	3,814	450,688	2,601,924	458,872
Philadelphia & Reading	1,006	23,640,625	4,520,637	29,391,598	2,273,933	5,807,681	318,460	8,966,800	496,948	17,863,822	11,527,776	270,393	549,188	11,248,981	127,106
Pittsburgh, Cin., Chic. & St. Louis	1,472	16,460,332	5,175,118	24,436,057	2,715,224	4,310,974	551,625	8,599,818	502,360	16,680,001	7,756,056	4,750*	1,077,755	6,673,551	118,115
St. Louis & San Francisco	4,727	18,032,343	6,945,783	27,058,623	3,851,477	3,466,119	588,428	9,304,578	836,190	18,046,792	9,011,831	.....	1,139,048	7,872,783	336,336
Seaboard Air Line	2,613	8,521,970	2,642,598	12,333,550	1,738,943	1,776,649	434,850	4,221,528	422,714	8,594,684	3,738,866	11,112*	461,606	3,266,148	820,382
Texas & Pacific	1,885	7,792,543	2,844,464	11,404,425	1,326,810	1,721,724	137,638	4,374,164	300,538	7,860,974	3,543,451	19,416*	500,388	3,023,647	286,948
Union Pacific	3,310	25,097,333	7,298,530	35,293,251	3,198,285	3,681,316	754,545	8,354,827	906,914	16,895,887	18,397,364	16,882*	986,070	17,394,412	4,375,396
Vandalia	829	4,246,102	1,653,109	6,646,272	941,449	1,099,376	190,654	2,568,053	151,053	4,950,585	1,695,687	.....	227,287	1,468,400	†94,568
Wabash	2,515	12,927,430	4,833,537	19,360,103	2,116,670	2,965,431	611,278	7,489,332	619,355	13,802,066	5,558,037	14,919*	612,431	4,930,687	†100,079
Yazoo & Mississippi Valley	1,371	5,567,858	1,614,491	7,638,384	1,489,507	1,373,545	142,326	2,918,587	213,507	6,137,472	1,500,912	24,248	300,045	1,225,115	†141,001

*Deficit. †Decrease.

Missouri Rate Case.

A. P. Murphy, Representative in Congress from the Sixteenth district of Missouri, on May 3 introduced a resolution in the lower house of Congress asking for a congressional investigation of the conduct of Judges Smith McPherson and John F. Philips in connection with the trial of the cases involving the validity of the Missouri freight and passenger rate laws. The resolutions allege that the state was treated unfairly in the trial of these cases, and refer to a fishing trip that was made by Judges McPherson and Philips as guests of Gardiner Lathrop, General Solicitor of the Atchison, Topeka & Santa Fe, in Mr. Lathrop's private car. The party went to Tampico, Mex., and other persons besides those mentioned were in the party. Judge McPherson issued a statement at St. Louis on May 4, in which he said that Judge Philips had practically nothing to do with the rate cases, and the references to him did him a great injustice. Referring to his own conduct, Judge McPherson said he was willing to undergo a congressional investigation if a single member of Congress besides Mr. Murphy thought there should be one. He reviewed the various steps in the rate litigation; said that they were all taken publicly and in their proper order, and vigorously denied that the state had not been treated with all proper consideration. He said that he was glad to be the guest of Mr. Lathrop, who was his personal friend and a "man of the highest character," on the fishing trip alluded to. It was merely a pleasure trip and the rate cases were not discussed.

It was reported that Mr. Murphy would ask for the impeachment of the two jurists, but it was later given out at Washington that he would not press the matter at this session of Congress. Governor Hadley, of Missouri, gave out a statement entirely repudiating any connection with Mr. Murphy's resolution. Frank Hagerman, who was counsel for the Missouri roads in the litigation, sent a telegram to Attorney-General Wickersham denouncing the resolution as an "outrageous tissue of misrepresentation by one who has no knowledge of the facts."

Judge McPherson heard arguments of counsel in Kansas City on May 5 on the application of the railways for an order permanently to restrain the state from proceeding in the courts of Missouri to prevent them from advancing their passenger rates. During the hearing Judge McPherson asked Attorney-General Major if he intended to appeal to the United States Supreme Court from the decision holding the Missouri freight and passenger rate laws unconstitutional, and Mr. Major replied that he did. Judge McPherson continued the injunction to restrain the circuit attorney of St. Louis from prosecuting the suit filed by him in the state circuit court of that city to restrain the roads from raising their passenger rates to 3 cents a mile.

INTERSTATE COMMERCE COMMISSION.

Report on Hocking Valley and Wheeling & Lake Erie Coal Traffic.

The Interstate Commerce Commission on May 10 sent to Congress a report on the inquiry which it has made, under the resolution of March 7, 1906, relative to charges of discrimination and monopoly in the coal traffic in the state of Ohio, including also the Kanawha & Michigan Railway, which lies in West Virginia.

The report fills twenty pages, and about three-fourths of this space is taken up with detail statement of the relations of the railway companies to various coal mining enterprises. The Hocking Valley was organized in 1899. It has no important competitors in the Hocking Valley coal districts. The Toledo & Ohio Central, working with the Kanawha & Michigan, hauls coal from the Kanawha district in West Virginia. Both the Hocking and Kanawha fields compete with the Pittsburgh district, all shipping to Lake Erie and beyond. The Hocking Valley and the Toledo & Ohio Central work in complete harmony, though there is no joint control or ownership. The Zanesville & Western is owned by the Toledo & Ohio Central, having taken this from the Hocking Valley, and in turn the Toledo & Ohio Central conveyed to the Hocking Valley the control of the Kanawha & Michigan.

The Hocking Valley Railway controls and largely owns the stock of the Sunday Creek Coal Company, which includes several subsidiary companies, and also controls the Raybould Coal Company and the Boston Coal, Dock & Wharf Company.

The Hocking Valley and the Toledo & Ohio Central railways in 1901 guaranteed $2,750,000 of bonds of the Kanawha & Hocking Coal & Coke Company owning coal properties on the Kanawha & Michigan Railway. In the agreement under which this guarantee was made the coal company bound itself to ship coal over the Kanawha & Michigan and the Kanawha & Michigan agreed to buy its fuel from the coal company.

In 1902 the two railways guaranteed the same amount of bonds for the Continental Coal Company, formed for the purpose of acquiring coal lands in the Hocking district, on the lines of the Hocking Valley and the Toledo & Ohio Central. In both of these guarantees officers and directors of the railway companies, or firms in which they were partners, were interested, and received bonuses in stock.

In April, 1906, the Sunday Creek Coal Company was dissolved and the Sunday Creek Company succeeded it, and in this reorganization it appears that for the bonus stock received by the members of the Kanawha & Hocking Coal & Coke Company and the Continental Coal Company syndicates they received $3,885,000 of 5 per cent. collateral trust bonds of the Sunday Creek Company. In other words, the members of the syndicates, or the subsequent parties in interest, received $3,885,000 in bonds issued by a company whose entire capital stock was owned by the Hocking Valley and Toledo & Ohio Central railways, and to which was conveyed the property of the Sunday Creek Coal Company.

When the bonds of the Sunday Creek Company were offered for sale it was asserted that its property was worth $36,000,000.

The total investments of the Hocking Valley Railway Company in coal stocks at its organization amounted to $4,003,299. and during the succeeding seven years (to 1906) the railway spent $362,760 for Sunday Creek Coal Company stock, and its coal property holdings now aggregate four and three-fourths millions.

The Sunday Creek Company has thus far shown no profits, although its constituent companies formerly showed profits in some of the years, though losses in others.

The Toledo & Ohio Central owns the Imperial Coal Company and the National Coal Company ($460,000 of stock), but these companies lease their lands. This road owns $513,700 stock in the Sunday Creek Company; it is a joint guarantor with the Hocking Valley on $3,091,000 of the bonds of the Kanawha & Hocking Coal & Coke Company and $2,413,000 of the bonds of the Continental Coal Company.

The Wheeling & Lake Erie Railroad in 1904 got certain coal companies to furnish 1,500 coal cars under an agreement that the railway should subsequently buy the cars, the railway company claiming that it had neither capital nor credit with which to buy cars sufficient for its coal traffic. In 1901 the Wheeling & Lake Erie acquired $1,250,000 of stock of the Pittsburgh, Wheeling & Lake Erie Coal Company, and it has advanced $104,590 to that company, and to this extent has impaired its ability to supply itself with cars. The Wheeling & Lake Erie has made many contracts with coal mines for side tracks, but there is no evidence of discrimination.

In 1903 the Baltimore & Ohio, the Lake Shore & Michigan Southern (New York Central), the Pittsburg, Cincinnati, Chicago & St. Louis (Pennsylvania), the Chesapeake & Ohio, and the Erie jointly purchased a large amount of the common stock of the Hocking Valley Railway, resulting in a practical control of the Hocking Valley by the so-called "Trunk Line Syndicate." The Norfolk & Western and the Wheeling & Lake Erie were not interested in this purchase, but with the exception of these two railways, with the identity of officers and inter-relations between the Hocking Valley, the Toledo & Ohio Central, the Zanesville & Western, and the Kanawha & Michigan—with the trunk-line control of the Hocking Valley—an identity of interest was created which in effect results in practical control of the transportation of coal from the districts named by three interests; that is, the Pennsylvania, the Baltimore & Ohio, the New York Central, the Hocking Valley, the Chesapeake & Ohio, and the Erie as one interest; the Wheeling & Lake Erie as the second, and the Norfolk & Western as the third. The Trunk Line Syndicate appears

to have actively controlled the policy of the coal roads, especially in refusing to make track connections at mines and in directing the policy of the coal companies allied with the Hocking Valley.

The Hocking Valley and the Toledo & Ohio Central have guaranteed more than six million dollars of the bonds of the coal companies, and from these transactions the officers and directors have received large profits.

The right of the railways to hold interests in coal companies has been before the courts in a number of cases, and numerous decisions are cited to show that the railway companies have exceeded their powers.

In summing up, the Interstate Commerce Commission finds that the Hocking Valley and the Kanawha & Michigan, after acquiring their two large coal companies, discouraged all further development of coal mines by refusing to make track connections and by imposing burdens when connections were made. Details are given of attempts of coal mines to secure track connections. In a number of cases the railway called upon the coal company to have a railway company incorporated to operate the connecting track, and also required the coal company to furnish some cars. "These so-called railways are not railways," says the commission; for the courts have decided that tracks laid for such private purposes cannot be classed with common carriers.

The Hocking Valley did not substantially increase its equipment from 1902 to 1908, whereas if it had properly expended the four and three-fourths millions which it advanced to the coal companies, it could have provided for the wants of all the coal operators and all the new mines that might have been opened. Other coal districts in Ohio, Pennsylvania and West Virginia have greatly increased their output since 1900, while on the Hocking Valley there has been no increase. While the Hocking district is not a new one, and consequently its tonnage would not increase as would that of a new district, yet the presumption seems reasonable that by the elimination of individual operators and their strife for business, and the impairment of its financial ability to furnish additional facilities the Hocking Valley Railway has prevented increase in the quantity of coal originating on its lines.

The results of the operation of the Sunday Creek Company show large losses, which must necessarily be the loss of the Hocking Valley and the Toledo & Ohio central railways, which own all of the stock of the Sunday Creek Company. It would be but natural for those railways to throw all their influence to the securing of coal contracts to the Sunday Creek Company, even at prices which would not show a profit in the production of the coal.

The commission finds that on the Kanawha & Michigan the policy of discouraging new enterprises was the same as on the Hocking Valley. The commission has heard no complaint as to the rules of car distribution, or of mine rating in force on either the Hocking Valley, the Toledo & Ohio Central, the Zanesville & Western, the Kanawha & Michigan, or the Wheeling & Lake Erie roads. It does not appear that stock in coal companies served by these roads is owned by any subordinate officials of the railways, or by persons who have charge of the distribution of cars.

STATE COMMISSIONS.

W. H. Boys, Chairman of the Railroad Commission of Illinois, has tendered his resignation to Governor Deneen, and B. A. Eckhart, one of the Commissioners, is acting Chairman.

The Railroad Commission of Oregon has made an order reducing all rates of the Pacific Express Company. The reductions vary from as low as 10 per cent. to as high as 50 per cent.

Thomas J. Hillery has been appointed a member of the New Jersey Railway Commission, succeeding Borden D. Whiting, whose term of office expired May 1. Frank N. Sommer has been elected President of the Commission.

The Railroad Commission of Texas has called on the railways for fuller monthly reports of accidents. If an accident is due to defect of track or equipment, such defect must be fully described, and if to negligence of employees, explanation must be given as to the nature of the negligence. The report must also give the extent of damage to property and injuries to persons.

The State Railroad Commission of Indiana has extended for one year the time within which certain railways of that state must adopt the block system. The law applies to all roads earning $7,500 per mile per year gross. Power was granted to the commission to exercise its discretion in postponing the date for compliance, but not more than one year from July 1, 1909. According to the press despatches the companies named in the order are the Grand Rapids & Indiana, the Wabash, the Toledo, St. Louis & Western, the Grand Trunk, the Chicago, Indianapolis & Louisville, and the New York, Chicago & St. Louis. The commission will probably grant similar extensions to other companies. The ground of the decision is said to be the bad financial condition of the roads.

William J. Wood, Chairman of the Railroad Commission or Indiana, has been reappointed by Governor Marshall for a term of four years. Mr. Wood was one of the commissioners appointed when the Commission was organized two years ago, and the general fairness that has marked his official attitude is indicated by the fact that he was endorsed for reappointment by shippers, railway officers and railway employees. Mr. Wood has taken a lively interest in the matter of railway accidents, and it is largely due to him that the Indiana Commission has done what it could to reduce the number of accidents to wayfarers at crossings and to trespassers. His reappointment is generally regarded by those familiar with the work of the Commission as a proper recognition of faithful public service.

COURT NEWS.

In the Supreme Court of New York, May 10, Addie M. Hunt, a trained nurse, was awarded $58,000, by a jury, in her suit against the Long Island Railroad. In boarding a train Miss Hunt sustained injuries necessitating amputation of both legs. The case had been tried before and $25,000 awarded; but that verdict was set aside on the ground that the amount was insufficient; and the Appellate division of the Supreme Court had sustained the action of the lower court in thus deciding.

In the United States Circuit Court at Richmond, Va., May 6, the Southern, the Atlantic Coast Line, the Norfolk & Western and the Chesapeake & Ohio withdrew their suits against the chairman of the State Corporation Commission. The suits were based on objection to the 2-cent passenger fare, which was fixed by the state. The railways say they are satisfied with the increase to 2½ cents a mile. The court absolves the railways from liability for any of the coupons issued under the order of the Corporation Commission or to any holder of such coupons, which are declared void and worthless.

Decision in Santa Fe Rebate Case.

As stated by the *Railroad Age Gazette* in its issue of May 7, 1909, page 1002, the United States Circuit Court of Appeals for tne Ninth circuit on May 3 rendered a decision reversing the decision of Judge Wellborn of the United States District Court for the Southern district of California, in the case of the United States against the Atchison, Topeka & Santa Fe, in which Judge Wellborn fined the defendant road $330,000 for the alleged giving of rebates to the Grand Canyon Lime & Cement Company on shipments of lime from Nelson, Ariz., to Los Angeles, Cal. The decision of the United States Circuit Court of Appeals is important both because of its reversal of a decision which was given wide notoriety and which imposed the largest fine ever levied on a railway for alleged rebating, and because of the interpretation it places on certain provisions of the Elkins act, which are still a part of the amended Interstate Commerce act.

The specific provision of the Elkins act, which it was alleged was violated, is the following:

"The wilful failure upon the part of any carrier subject to said acts to file and publish the tariffs or rates and charges as required by said acts or strictly to observe such tariffs until changed according to law, shall be a misdemeanor; . . . and it shall be unlawful for any person, persons or corporation to offer, grant or give or to solicit, accept

or receive any rebate, concession, or discrimination in respect of the transportation of any property in interstate or foreign commerce by any common carrier subject to said act to regulate commerce and the acts amendatory thereto whereby any such property shall by any device whatever be transported at a less rate than that named in the tariffs published and filed by such carrier, as is required by said act to regulate commerce and the acts amendatory thereto, or whereby any other advantage is given or discrimination practiced."

Judge Ross, in delivering the opinion of the court, said in part:

"On the trial the government introduced the tariff established by the defendant company and filed with the Interstate Commerce Commission, showing the rate over its line of road on lime from Nelson to the stations referred to in the indictment to be $3.50 per ton for a minimum carload weight of 40,000 lbs.

"It was also shown on the trial that during the time covered by the indictment—more than one year—384 cars, or thereabouts, of lime, aggregating between 9,000 and 10,000 tons, and on which the total freight amounted to about $32,000, were shipped from Nelson over the defendant's road, concerning 66 of which cars (those embraced by the indictment) a question arose between the shipper and the railway company in respect to lime claimed by the shipper to have been lost therefrom in transit, amounting in value to from 35 cents to $14.35 a car, and aggregating less than $500. Frederick P. Gregson, the freight agent of the defendant company having charge of such matters, was called as a witness by the government, and was examined by its counsel as well as by the counsel for the railway, and, in respect to those claims made by the shipper for those losses, gave testimony tending to show that in respect to each of the 66 shipments covered by the indictment, the shipper complained to the company that the full minimum carload weight of 40,000 pounds had been loaded into the cars of the plaintiff in error at Nelson, and that a freight bill for the minimum carload, according to the tariff, of $70 had been made, and that that amount was demanded by the defendant company for freight on each of those cars, but that, as a matter of fact, according to the railway company's scales at or near the destination of the shipment, it appeared that each of the 66 cars contained less than 40,000 pounds of lime, in consequence of which the shipper insisted that the company had lost in transit his lime to the amount of the difference between 40,000 pounds and the weight so shown by the scales, and insisted that he should not lose the lime and at the same time pay freight on the lime so lost; that it cost $3.50 per ton to produce the lime at Nelson, and as the freight, according to the tariff, was $3.50 per ton, the shipper offered to waive any claim for the loss of the lime if the company would waive demand for the freight on the amount so claimed to have been lost, and that a compromise was made between the witness, acting for the railway company, and the shipper on that basis, and that the company accepted payment only on the lime actually transported, at the rate of $3.50 a ton. Other witnesses gave testimony tending to corroborate that of Gregson, all of which evidence was subsequently, on motion of counsel for the government, withdrawn from the consideration of the jury and stricken out, and the jury subsequently instructed, in part, as follows:

"'The parties having stipulated that the government's exhibit No. 5 is a copy of the tariff filed by the defendant with said Commission (Interstate Commerce Commission), said exhibit was, at the times mentioned in the indictment, its legal tariff, under and by virtue of which the rate of freight on lime in carload lots from Nelson to points on its line south of Barstow is fixed at $3.50 per ton, applicable to quantities of not less than 40,000 lbs., or 20 tons, and that said tariff was binding and conclusive on the defendant, and it could not by any means whatever lawfully charge or collect for the transportation of any of the property mentioned in the indictment any greater or less rate than that specified in said tariff. You are further instructed that if the defendant did accept for the transportation of said lime a less rate than that fixed by its legal tariff, it is wholly immaterial whether the difference between the tariff rate and the rate so accepted was large or small. You are further instructed that if you find that the defendant did accept and receive for the transportation of said lime a less rate than that fixed by said tariff, you need not inquire or determine whether or not the defendant intended thereby to violate the law, for such intention or lack thereof upon its part is entirely immaterial.'

"These rulings and instructions of the court below, as well as the instructions hereinafter referred to, were excepted to by the defendant, and are here assigned as error.

"The indictment does not charge, nor in the record is it anywhere contended, that there was in the first place any agreement or understanding of any nature that the defendant should carry the lime at any departure or concession from the established rate, and, while it is entirely true that it was the purpose of the statutory enactments upon the subject to cut up by the roots the entire system of rebates and discriminations, however made, by railways in favor of particular localities, special enterprises, favored corporations or individuals, and that the courts should be astute to discover and severely punish any and every such unlawful and wicked act, it was not, we think, the purpose of Congress to punish as a crime any innocent act committed by a corporation any more than by an individual.

"The view taken by the trial court of the nature of the charge made by the indictment in its ruling on granting the government's motion to strike out all of the evidence tending to show that the deductions made from the original freight bills by the defendant's agent, varying from 35 cents to $14.35, on the 66 carloads in question, because of the contention of the shipper that he was not legally bound and should not in justice pay freight on lime lost by the company in transit and which it did not transport, is shown by the ruling itself, where the learned judge said:

"'I hold that the acceptance by the defendant of a less sum of money than that named in its tariff for the transportation of the property described in the indictment, if there has been such acceptance, was a departure from the legal rate, and that it is no justification for such a departure, nor is it any defense to a prosecution therefor, that the acts of the carrier were done in compromise of claims for loss of property in transit.'

"Passing, for the moment, the question whether the collection of less than $3.50 a ton for all the lime in fact transported by the railway for the shipper between the stations mentioned is in law or fact any departure from the established rate of $3.50 a ton on that commodity between those stations, it is plain, we think, that if the charge upon which the defendant was being tried was, as indicated in the ruling of the court from which we have quoted, 'a departure' by the defendant from its established rate, then clearly the intention with which such departure was so made was of the essence of the offense, because made so by the statute itself in expressly denouncing such departure when 'wilfully' made.

"When the court below, however, came to charge the jury, it instructed them that to constitute the offense charged in the first count of the indictment, 'five things are necessary,' the first three of which need not be referred to, since they were stated by the court to be admitted. The fourth and fifth were stated by the court to be as follows:

"'Fourth. That the defendant, as alleged in said count, filed with the Interstate Commerce Commission a tariff or schedule of rates, of which U. S. exhibit No. 5 is a copy, and that the lawful amount of freight due the defendant on said shipment under said tariff was $70.

"'Fifth. That said amount of $64.75 was paid by said Schirm and that its acceptance by defendant was a concession by defendant to said Schirm whereby said lime was transported at a less rate than that named in said tariff.'

"If, as we take it, by the word 'concession' in these instructions the court meant the 'departure' from the tariff rate referred to in its above-quoted ruling in striking out the evidence referred to, the same observations are of course applicable to such 'concession' as to the departure from the tariff rate, that is to say, it must have been 'wilful' to constitute a crime under the statute.

"Although the charging part of count one of the indictment does not use the word 'concession,' it does allege in effect that the rate established and published by the defendant per car from Nelson to Los Angeles was $70.00 and that notwithstanding that sum was a lawful rate for the transportation between those points for such carloads of lime the defendant did charge, demand and receive for the car referred to in count one the sum of $64.75 and no more. Since the defendant of course knew and must be held to have known the tariff of rates established and published by itself, the averment that notwithstanding the alleged rate of $70.00 for the car referred to, the defendant, in fact, charged and accepted $64.75 only would seem to be sufficient to constitute the concession prohibited by the statute. The name is of but little moment; the essence of the thing is what characterizes and identifies it. Therefore, we conclude that the objections made by the defendant to the sufficiency of the indictment are not well taken.

But the established and published tariff introduced by the government does not support that charge. The tariff rate as established and published by the defendant for the transportation of bulk lime between Nelson and Los Angeles was $3.50 a ton in carload lots of not less than 40,000 lbs. It is true that to entitle the shipper to that rate he was required to put into the car at least 40,000 lbs., and it is also true that by loading that quantity he was entitled to that rate regardless of how much the carrier might deliver at the point of destination. If the shipper put in the car more than 40,000 lbs. he was not entitled to a rate of $70.00. In that event he was required to pay not $70.00 only, but $3.50 a ton on the quantity actually loaded and delivered, that is to say, $3.50 a ton was the established and published rate—not $70.00 a car. It is true that the freight would amount to $70.00 in cases where exactly 40,000 lbs. were loaded and transported; but that was a mere incident. It might be more and it might be less—more when more than 40,000 lbs. were loaded and transported, and less where at least 40,000 lbs. were loaded, but not that amount was transported and delivered at the point of destination; the rate, however, all the time remaining the same, to-wit, $3.50 a ton. Gregson testified, among other things, that the shipper explained to him how the loading was done at Nelson, which was a remote and unimportant station, and convinced him that at least 40,000 lbs. of lime were loaded into everyone of the cars shipped from that place. The shipper was, therefore, as has been said, legally entitled to have each of those shipments transported at the rate fixed in the defendant's tariff, to-wit, at the rate of $3.50 per ton. The loss of some of the lime by the carrier in transit could not legally or justly deprive the shipper of the rate applicable to the minimum carload weight, any more than it would confer upon the carrier the right to charge for the transportation of that which it did not transport. The loss in transit was the fault of the carrier, for which loss it, and not the shipper, must be held to be the sufferer. Assuming, as of course we must in passing upon the rulings of the trial court, the facts to be as the evidence tended to prove them, we do not see how, under the circumstances testified to, it can be fairly said that the shipper in this case had his lime transported at a less rate than the regularly established and published rate; he was entitled to the carload rate of $3.50 a ton because he loaded at least 40,000 lbs. in each of the cars in question, and he was not legally or equitably bound to pay freight on any of the lime which the carrier lost in transit and failed to deliver at the point of destination.

"Of course, if all of this was a mere pretence, and if in truth it constituted but a concocted scheme or device of the defendant for the purpose of departing in any way from its established and published schedule or making to the shipper any concession of any character, the crime denounced by the statute was committed; but that was a question of fact for the jury, in the consideration and determination of which the evidence stricken out was important to the defendant. While courts rightly are keen to penetrate an innocent appearing device to reach an illegal transaction,' said the Court of Appeals for the Seventh Circuit in a case involving an alleged criminal violation of the Elkins Act, 'they should also be alert to save a lawful act though it be hid under a false cover.' Chicago & A. Ry. Co. v. United States, 156 Fed. 558, 560. And in the case of Camden Iron Works v. United States, 158 Fed. 561, 564, which was also based on the Elkins Act, the Circuit Court of Appeals for the Third Circuit said: 'It is pertinent to remark that the legislation which has been under examination is highly penal in its character, and while it is the duty of the courts to so construe its terms as to suppress, if possible, the mischief against which it is directed, it is no less their duty to see to it that no person, natural or artificial, shall be held guilty of a crime, upon an interpretation of the statute creating it, which does not appear with at least a reasonable degree of certainty to be the correct one.' * * *

"The question of intent entered into the charge made by the indictment against the defendant in the present case, and, that being so, it necessarily results that the court below was in error in withdrawing from the consideration of the jury the evidence to which reference has been made, and in the giving of its instructions.

"The judgment is reversed and cause remanded for a new trial."

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

L. S. Miller, General Manager of the Central New England, has been elected President of the Millbrook Company.

Albert T. Perkins has resigned as Expert Adviser of the Municipal Bridge and Terminals Commission of St. Louis, Mo.

Charles G. Cunningham has been appointed the General Counsel of the Toledo Terminal Railroad, with office at Toledo, Ohio, succeeding F. W. Stevens, resigned.

Rodney S. Durkee has been appointed Auditor of the Nevada Northern, with office at East Ely, Nev., succeeding W. T. Ford, resigned to engage in other business.

The Rapid City, Black Hills & Western has acquired the property of the Missouri River & Northwestern. The following officers of the Rapid City, Black Hills & Western have been elected: President, George E. Macomber, Augusta, Me.; Vice-President, A. B. Osborne, Erie, Pa.; Treasurer, James Halley, Rapid City, S. Dak.; Secretary, Charles E. Hoyt, South Norwalk, Conn. The general offices of the company are located at Rapid City, S. Dak.

The promotion of C. P. Cooper from Manager of the St. Louis-Louisville Lines of the Southern Railway to the office of General Agent in the Operating department, with office at Memphis, Tenn., was announced by the *Railroad Age Gazette* last week under the heading "Operating Officers." Mr. Cooper's duties as General Agent are of an executive nature, and he will report to and perform such duties as may be assigned to him by the President or Vice-Presidents.

Operating Officers.

Geo. W. Turner has been appointed the Assistant Superintendent of the Butte division of the Great Northern at Great Falls, Mont., succeeding C. F. Murphy, resigned.

J. D. Finnegan, Secretary and Treasurer of the St. Louis, Brownsville & Mexico, has been appointed the Superintendent of Transportation, succeeding T. J. McCune, resigned.

D. T. Murphy, Trainmaster of the Duluth, Rainy Lake & Winnipeg, has been appointed the Assistant Superintendent, with office at Virginia, Minn., and his former office has been abolished.

H. F. Matthews has been transferred as Assistant General Superintendent of Sleeping, Dining and Parlor Cars of the Canadian Pacific from Montreal, Que., to Winnipeg, Man., succeeding W. Bell, transferred.

W. E. Moore has been appointed the General Manager and J. L. Soule has been appointed Superintendent, both with office at Rapid City, S. Dak., of the Rapid City, Black Hills & Western, which has acquired the property of the Missouri River & Northwestern.

The Hine system of organization having been adopted on the Maricopa & Phoenix and on the Phoenix & Eastern, T. J. Marks, Trainmaster, has been appointed an Assistant Superintendent; A. N. Munn, Master Mechanic, has been appointed an Assistant Superintendent, and J. G. Dilly, Roadmaster, has been appointed an Assistant Superintendent, all with office at Phoenix, Ariz. Their former titles have been abolished.

For the better handling of its traffic, the Denver & Rio Grande has divided its Western line, from Grand Junction, Utah, to Ogden, into two divisions, to be known as the Salt Lake and the Green River divisions. A. B. Apperson, Assistant Superintendent of the Utah lines, has been appointed the Superintendent of the Salt Lake division. O. J. Ogg, Assistant Superintendent of the Utah lines, with office at Helper, Utah, has been appointed the Superintendent of the Green River division. C. W. King, Trainmaster at Salt Lake City, has been appointed Assistant Superintendent, with jurisdiction over the main line from Ogden to Thistle, and over the Herbert, Tintic and Marysville branches. F. O. Haymond,

Trainmaster at Bingham, Utah, has been appointed Assistant Superintendent, with jurisdiction over the Garfield and Cuprum branches and over the Copper Belt Railway. C. T. Roberts, Trainmaster at Tucker, has been appointed Assistant Superintendent, with jurisdiction over the main line from Thistle to Helper and over the Pleasant Valley branch. The office of Trainmaster, from which the officers referred to have been promoted, has in each case been abolished.

Traffic Officers.

W. H. Thompson, until recently Chief Clerk of Tariff Bureau of the Erie, has been appointed the Chief Clerk to the General Freight Agent.

W. S. Weber has been appointed a Traveling Passenger Agent of the Great Northern with office at Spokane, succeeding Edward Furniss, deceased.

W. B. Barr, General Freight and Passenger Agent of the Chicago Terminal Transfer, has become Vice-President of the Traffic Service Bureau, with office at Washington, D. C.

Geo. B. Smith has been appointed a Traveling Freight and Passenger Agent of the Chicago, Burlington & Quincy, with office at Tacoma, Wash., succeeding L. E. Le Hane, resigned.

J. D. Gowin, Soliciting Freight Agent of the Rock Island-Frisco Lines at Fort Worth, Tex., has been appointed a Travelling Freight Agent with office at Dallas, succeeding J. F. Brooks, promoted.

F. S. Speelman has been appointed a Traveling Freight Agent of the Missouri Pacific with office at Pueblo, Colo., succeeding W. W. Trimble, promoted to Traveling Freight Agent at Memphis, Tenn.

John Kurvy has been appointed the General Eastern Passenger Agent of the Chesapeake & Ohio, with office at 362 Broadway, New York, succeeding U. L. Truitt, resigned to engage in other business.

T. F. Butler, Commercial Agent of the Ann Arbor Railroad & Steamship Lines at Toledo, Ohio, has been appointed a Division Freight Agent, with office at Toledo. The office of Commercial Agent has been abolished.

H. C. Franks, Traveling Freight Agent of the Chicago, Rock Island & Gulf at San Antonio, Tex., has been promoted to Commercial Agent of the Rock Island-Frisco Lines, with office at San Antonio, succeeding R. O. McCormack, resigned. John T. Brooks succeeds Mr. Franks.

J. P. O'Donnell, formerly General Freight and Passenger Agent of the Oklahoma Central, at Purcell, Okla., has been appointed a Traveling Freight Agent of the United Steamship Company, with headquarters at Galveston, Tex., succeeding F. A. Morris, transferred to Havana, Cuba.

The following Commercial Agents of the Detroit, Toledo & Ironton have been appointed Division Freight Agents: H. A. Fidler, at Ironton, Ohio, in charge of territory from Ironton to Waverly; J. F. Blumensteil, at Springfield, Ohio, in charge of territory from Sosco, Ohio, to Lima; D. W. Dirr, at Detroit, Mich., in charge of territory from Cairo, Ohio, to Detroit, Mich. The office of Commercial Agent has been abolished in each of these places.

F. D. Burroughs, Chief of the Tariff Bureau of the Chicago, Milwaukee & St. Paul, with office at Chicago, has been appointed an Assistant General Freight Agent of the Chicago, Milwaukee & Puget Sound, temporarily at Chicago, and later to be at Seattle, Wash. W. P. Warner has been appointed an Assistant General Freight and Passenger Agent, with office at Butte, Mont., having supervision of traffic in Montana west of and including Lombard, Mont. W. J. Keeley has been appointed a Division Freight and Passenger Agent, with office at Miles City, Mont., having supervision of traffic in South Dakota, North Dakota and in Montana east of Lombard. Hugh Chittick has been appointed General Live Stock Agent, with office at Miles City, Mont.

Engineering and Rolling Stock Officers.

F. E. Fox, Master Mechanic of the Denver & Rio Grande, at Denver, Colo., has resigned.

J. G. Kirby has been appointed the Assistant General Foreman of the Locomotive department shops of the New York Central & Hudson River at Avis, Pa.

Sheridan P. Jordan has been appointed the Roadmaster of the Sandusky division of the Lake Shore & Michigan Southern, with office at Sandusky, Ohio, succeeding C. Buhrer, resigned on account of ill health.

The titles of Master Mechanic and Roadmaster have been abolished on the Maricopa & Phoenix and the Phoenix & Eastern and the new positions created in consequence are announced under Operating officers.

A. H. Gairns, Division Master Mechanic of the Oregon Short Line, with office at Pocatello, Idaho, has been appointed Master Mechanic of the Idaho division only, with office at Pocatello. H. Carrick, Assistant Division Master Mechanic at Pocatello, has been appointed Master Mechanic of the Montana division, with office at Pocatello. George Ross, district foreman at Salt Lake City, Utah, has been appointed Master Mechanic of the Utah division, with office at Salt Lake City, and the office of district foreman has been abolished. The office of traveling engineer, formerly held by Peter Sorensen, has been abolished.

J. H. Davis, Assistant Electrical Engineer of the Baltimore & Ohio, has been appointed the Electrical Engineer, with office at Baltimore, Md., succeeding L. T. Gibbs, deceased. Mr. Davis studied both civil and electrical engineering at the University of Arkansas, receiving the degree of Electrical Engineer in 1897. He then became associated with the St. Francis Levee Board, doing dike and levee work along the Mississippi in the neighborhood of Memphis, Tenn., under the supervision of the United States Army. In 1901 he became connected with the Electrical department of the Pennsylvania, and in 1905 was appointed Assistant Electrical Engineer of the Baltimore & Ohio.

OBITUARY.

R. P. Algeo, formerly District Passenger Agent of the Cincinnati, Hamilton & Dayton, died May 6 at his home in Cincinnati, Ohio.

Albert D. Kelly, Assistant General Baggage Agent of the Pennsylvania, died at his home in Sewickley, Pa., from a hemorrhage on May 7.

J. Fewson Smith, a Civil Engineer, and at one time an Assistant Engineer on the Union Pacific, died at his home in Salt Lake on May 5 after a long illness.

J. A. Perkins, agent in Milwaukee, Wis., for the Star Union Line of the Pennsylvania up to Jan. 1, 1901, on which date he retired on a pension, died in Milwaukee at the age of 79 years. Two daughters and a son survive him.

J. H. Bond, formerly Auditor of the Railroad Commission of Texas, died on a Southern Pacific train near El Paso, Tex., on May 4. He was appointed Auditor of the Texas Commission in 1906 and held that position up to his resignation a short time ago. Before entering the employ of the Texas Commission he had held different positions in the Auditing departments of the Southern Pacific, the Galveston, Harrisburg & San Antonio and the Texas & Pacific.

S. M. Manifold, formerly General Superintendent of the Western Maryland, died at his home in York, Pa., on May 8 from pneumonia. He was born in 1842 in York county, Pa., and began railway work in 1872 on the Peach Bottom Railway, now the Maryland & Pennsylvania, as axman for the engineering corps. By 1876 he had become Superintendent and Chief Engineer, and in 1881 was made Manager for the Receiver. In 1892 he became connected with the transportation department of the Pennsylvania, and in August, 1899, became Superintendent of the Baltimore & Harrisburg division of the Western Maryland. In 1903 he was made General Superintendent, and in December of that year was made General Manager and Chief Engineer of the York County Traction Co. and also General Manager of the Edison Electric Light Co. at York, Pa. In 1905 he became Chief Engineer and Superintendent of Construction of the New Park & Fawn Grove Railway. Mr. Manifold is survived by a wife and eight children.

Railroad Construction.

New Incorporations, Surveys, Etc.

ALASKA CENTRAL.—According to press reports, about 500 men will shortly be at work on this line, building from Seward, Alaska, north. About 58 miles of the line are finished, and 20 miles additional will shortly be under construction across Placer Valley into Turuagail.

ARNPRIOR & PONTIAC.—An officer writes that this company was organized to build a number of lines radiating from Fitzroy Harbor, Ont., to connect with large electric smelters, which the company proposes to build in connection with the hydraulic development of 110,000 h.p. at Fitzroy Harbor. The lines will reach large deposits of iron ore in the immediate vicinity. The expenditures for these improvements will represent an investment of about $6,000,000. L. Simpson, of Valleyfield, Que., is the promoter and controls the water power. A. H. N. Bruce, Ottawa, Ch. Engr. (April 30, p. 960.)

ATCHISON, TOPEKA & SANTA FE.—A contract is said to have been given to A. Moore, of Newton, Kan., for building the first section of 40 miles from Plainview, Tex., on the proposed line from Texico, N. Mex., southeast to Brownwood, Tex. (March 19, p. 651.)

BANGOR & AROOSTOOK.—An officer writes that the branch from Van Buren, Me., northwest to Grand Isle, may be built this year. (April 23, p. 918.)

BUFFALO, ROCHESTER & PITTSBURGH.—The Walsh Construction Co., contractor, Davenport, Iowa, has been given the contract for two miles of line revision work on the Clearfield & Mahoning division, near Rockton, Pa. (April 30, p. 960.)

CANADIAN NORTHERN.—Contract is said to have been given to Janse & McDonnell, of Lethbridge, Alb., to build a 10-mile cut-off at Stanley Junction, Ont.

According to reports, a branch is to be built at once from Makinak, Man., northeast about 12 miles to Ste. Rose du Lac.

A contract will soon be awarded for the first 125 miles of the Vegreville, Alb., branch. (April 30, p. 960.)

Construction will be started at once on the branch from Camrose, Alb., to Calgary, 125 miles.

CANADIAN PACIFIC.—Contract is said to have been given to W. T. Parsons, of Winnipeg, Man., for a cut-off near Jackfish, Ont. (May 7, p. 1007.)

CENTRAL ONTARIO.—The Ontario legislature has voted a subsidy of $3,000 a mile for a 15-mile extension of the line now terminating at a junction with the Canadian Atlantic, between Whitney, Ont., and Madawaska. Construction work must be started within three months and completed within two years. (March 19, p. 660.)

CHAMPLAIN & SANFORD.—This company has filed with the New York Public Service Commission, Second district, an application for permission to change this route and motive power. When permission was granted to build this road it was specified that it should be operated by electric power. The company now asks that it may use either electrically-driven or oil-burning locomotives. (March 19, p. 652.)

CHICAGO, ROCK ISLAND & GULF.—The Amarillo division has been extended from Wildorado, Tex., west to Vega, 13.9 miles. (See Chicago, Rock Island & Pacific, Jan. 29, p. 235.)

COLUMBUS, PLAIN CITY & URBANA.—Incorporated in Ohio, with $10,000 capital and headquarters at Columbus, to build from Columbus west to Urbana, about 45 miles.

DOUSMAN & MARLBORO.—Incorporated in Wisconsin, with a capital stock of $25,000, to build a railway from Dousman, Wis., to Marlboro, about 6¾ miles. At Dousman the line will connect with the Madison division of the Chicago & North Western. The incorporators include: J. M. Pereles, T. J. Pereles, Jr., W. H. Lindwurm and H. Campbell, all of Milwaukee.

DUNNVILLE, WELLANDPORT & BEAMSVILLE (ELECTRIC).—Work is said to be under way by Contractor Lloyd, of Beamsville, Ont., on a 10-mile line between Dunnville, Ont., and Moulton townships. W. E. Werner, of St. Catharines, Ont., is said to be interested.

GRAND TRUNK.—An officer writes that it is probable in the near future the Hamilton-Niagara Falls line will be four-tracked to accommodate the increasing service, but that nothing has been done towards making plans to carry out this improvement.

KANSAS CITY JUNCTION.—Organized in Kansas, with $50,000 capital and headquarters at Kansas City, Kan., to build a line in Wyandotte county.

KANSAS CITY, LAMAR & DENVER.—Incorporated in Kansas, with $100,000 capital and headquarters at Concordia, Kan., to build from Concordia south to Salina, about 50 miles.

KANSAS CITY, MEXICO & ORIENT.—An officer writes that it is expected to have the line in operation about August 1 from Wichita, Kan., south to San Angelo, Tex., 510 miles. Work in Mexico is under way west of Minaca and east of Topolobampo. (April 23, p. 918.)

MANSFIELD RAILWAY & TRANSPORTATION CO.—The line from Mansfield, La., southwest to Hunters, 14 miles, is now in operation.

MONTANA, IDAHO & PACIFIC.—According to press reports the Harriman interests have incorporated this company with $16,000,000 capital to build from Lapwai Junction, Idaho, east through the Clearwater section of Idaho and the Lola Pass of the Bitter Root mountains, to Missoula, Mont., thence through Granite, Powell and Deer Lodge counties to Butte, where connection is to be made with the Oregon Short Line, about 350 miles. The incorporators include: J. H. Richardsand and C. E. Chrisman, of Boise, Idaho; J. G. Wilson, of Portland, Ore., and J. L. Wines.

MISSOURI SOUTHERN.—This company has extended its line from Reynolds, Mo., northeast to Bunker, 10 miles, giving the line a total mileage of 54 miles. (March 19, p. 656.)

NEW YORK, NEW HAVEN & HARTFORD.—Preliminary estimates relative to the extension of the electrification have been prepared and submitted for the information of the board of directors. The matter is now being considered, but it is not likely that any definite action will be taken or authority granted for some time.

NORTHERN PACIFIC.—A contract is said to have been given to Porter Bros. & Welch to build from Mandan, N. Dak., south, following the Missouri river to the Standing Rock Indian reservation. Work is to be started at once. Later reports say a contract has been given to E. A. Wickham, of Council Bluffs, Iowa, at $350,000, to build 40 miles from Mandan south to Cannon Ball. It is expected to have a large force of men at work soon.

PEOLA & SNAKE RIVER RAILROAD & NAVIGATION CO.—Incorporated in Washington with $400,000 capital and headquarters at Tacoma, to operate a line from Dead Man's Hollow at the Snake river, Garfield county, Wash., southeast to Peola. This is thought to be a Harriman project. W. Christian, of Tacoma, is interested.

PINE BLUFF, NORTH & SOUTH.—Incorporated in Arkansas, with $1,000,000 capital, to build from Pine Bluff, Ark., north to a point on the Missouri & North Arkansas, 1½ miles west of Georgetown, in White county, about 65 miles. Address V. O. Alexander, Pine Bluff.

QUEBEC & SAGUENAY.—See Quebec Railway, Light & Power Co.

QUEBEC RAILWAY, LIGHT & POWER CO.—An officer writes regarding the report that this road is to build an extension, that the Quebec & Saguenay proposes to build from the northern terminus of the Q. R. L. & P. Co. at Cape Tourmente, Que., northeast along the north bank of the St. Lawrence river, about 56½ miles. It is probable that the work will be started this fall; the line will cost $2,000,000, and arrangements may be made with the Q. R. L. & P. Co. to operate the line when built.

SOUTH DAKOTA INTERURBAN.—Incorporated in South Dakota, with headquarters at Centerville, and a capitalization of $1,000,000, to build an electric line from Sioux City, Idaho, northeast to Bijou Hills, S. Dak., about 160 miles. The incorporators include: F. E. Graves, W. E. Muller, R. W.

Thwing, C. E. Todd, all of Bijou Hills, and G. A. Miller, of Academy, S. Dak.

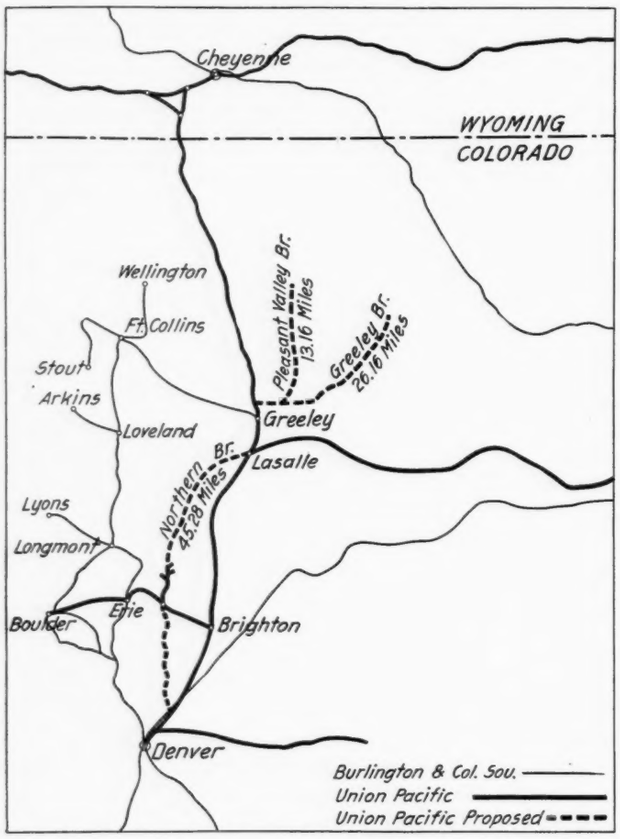
Southern.—The Tennessee & Carolina Southern has been opened for business from Maryville, Tenn., south to Chilhowee, 25.2 miles. (March 19, p. 658.)

Southern Pacific.—The San Joaquin division has been extended from Rademacher, Cal., eastward to Little Lake, 36 miles.

Tennessee Railway.—A new branch called the Nicks Creek branch, from Smoky Junction, Tenn., to Nicks Creek, three miles, has been opened for business.

Texas & New Orleans.—Announcement is made that the Rusk branch is open for business from Gallatin, Tex., on the Dallas-Sabine branch, south to Rusk, 8.29 miles. (March 19, p. 658.)

Union Pacific.—The work now under contract in Colorado includes the Pleasant Valley and Greely branches, building east and north from a point on the main line north of Greely, Colo.; a branch from Denver to a connection with the Boulder



Union Pacific Branch Lines in Colorado.

branch, near Erie, and one from Lasalle south to a branch of the main line. These latter branches will form a second line between Denver and Lasalle. The accompanying map indicates present progress. (March 19, p. 658.)

Wichita, Kinsley, Scott City & Denver Air Line.—Organized in Kansas with $200,000 capital and headquarters at Kinsley, to build through the counties of Sedgwick, Reno, Kingman, Pratt, Stafford, Edwards, Hodgeman, Lane, Finney, Scott, Wichita, Logan and Wallace.

Wisconsin Roads.—W. R. Lyle and W. H. Englebright, of Ripon, Wis., are said to be organizing a company, capitalized at $50,000, to build a railway from Ripon, Wis., to Green Lake, about 7½ miles. It is the intention to operate with gasolene motor cars.

Wyandotte & Lawrence.—Organized with $510,000 capital and headquarters at Kansas City, Kan., to build through the counties of Wyandotte, Leavenworth, Johnson and Douglas to a point near Lawrence, about 40 miles.

Railroad Financial News.

Canadian Northern.—A mortgage securing an issue of bonds amounting to $10,000 per mile on the company's line running from a point near Etoimami to Pas Mission, about 88 miles, has been filed.

Chicago & Eastern Illinois.—The suit brought by a bondholder of this company to set aside the traffic agreement dated April 14, 1904, between the Chicago & East Illinois, the St. Louis & San Francisco and the St. Louis, Memphis & Southeastern has been discontinued, it is said. An agreement was entered into in 1902 putting the properties of the Chicago & Eastern Illinois into the hands of a trustee in order to preserve these assets for the benefit of the stockholders, and trust certificates were then issued against the bonds of the railway. A second agreement made in 1904 gave the St. L. & S. F. nearly all the traffic of the C. & E. I., and on the strength of this agreement $16,000,000 bonds secured by the properties of the St. Louis, Memphis & Southeastern were issued. The tariff agreement expires June 1 and it is understood that the St. Louis & San Francisco interests have agreed not to renew the arrangement.

Chicago Great Western.—The following plan, differing only slightly from the tentative plan published in these columns on March 26, for the reorganization of the Chicago Great Western, which is in the hands of Horace G. Burt as receiver, is understood to be authoritative:

Holders of the present debentures will receive in exchange therefor 110 per cent. in new preferred stock.

Holders of preferred A stock will receive 120 per cent. in new common stock.

Holders of preferred B stock will be assessed 15 per cent. and will receive 60 per cent. in new common and 15 per cent. in new preferred stock.

Holders of the common stock will be assessed 15 per cent. and will receive 40 per cent. in new common and 15 per cent. in new preferred stock.

It is expected that the plan will be put into operation at once.

Interstate Railways (Philadelphia).—The interest coupons due February 1 on $10,776,600 Interstate 4 per cent. bonds, which interest was defaulted in February, were paid May 1. Foreclosure proceedings are apparently prevented.

Metropolitan Street Railway (New York).—The decree of sale dated March 18 has been modified by Judge Lacombe so as to adjourn the sale from June 1 to June 29. The purchaser is required to assume all pending contracts made prior to the sale by the receiver of the New York City Railway or the Metropolitan Street Railway, and to discharge any unpaid indebtedness incurred by the receivers before the delivery of the property which shall not have been paid by the receivers out of the proceeds of the sale.

New York City Railways.—See Metropolitan Street Railway.

St. Louis & San Francisco.—Speyer & Co., New York, are offering $10,000,000 general lien 5 per cent. bonds of 1907-1922-1927 at 91 to yield about 5⅞ per cent. Of the total authorized issue of $109,850,400 there are outstanding (including the above $10,000,000) $36,052,000. Speyer & Co. will accept St. Louis, Memphis & Southeastern five-year 4½ per cent. bonds maturing June 1, 1909, at 100⅛ in payment for the general lien bonds at 91. There are $15,529,929 of the 4½ per cent. bonds outstanding.

The bonds now offered are a direct obligation of the company covering all its property, and on June 1, 1909, on the redemption of the St. Louis, Memphis & Southeastern 4½ per cent. bonds, the 5 per cent. bonds will become a first mortgage on 665 miles of line of the St. L., M. & S. E., subject only to $489,125 existing bonds for the redemption of which general lien bonds are reserved.

Virginia Passenger & Power, Richmond, Va.—The property was sold on May 4 to a representative of the reorganization committee, which was the only bidder, for $8,100,000. The company's property includes electric lines in and around Richmond, Va., aggregating about 119 miles. (Aug. 7, 1908, page 694.)

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Southern is reported in the market for locomotives. This item is not confirmed.

The Coahuila & Zacatecas is reported to be figuring on a number of freight locomotives.

The Peoria & Pekin Union has ordered three six-wheel switching engines from the American Locomotive Co. for July delivery.

The New York Central Lines has ordered 3,000 fifty-ton steel hopper cars from the American Car & Foundry Co. The New York Central & Hudson River will receive 1,000 of these cars and the Lake Shore & Michigan Southern will receive 2,000.

The Chicago, Milwaukee & St. Paul is building 20 mikado locomotives at its shops in Milwaukee for use on its Pacific coast extension; one of them has been in service about two months and has met with the expectations of the builders in every respect. These engines will have cylinders 24 in. x 30 in. Diameter of driving wheels, 63 in. Tractive power, 46,630 lbs.

The New York Central Lines has ordered 71 locomotives from the American Locomotive Co. This is the locomotive equipment which was reported in the *Railroad Age Gazette* of March 12, and is as follows: Lake Shore & Michigan Southern, 20 freight; Michigan Central, 18 freight, 12 passenger, 15 switch, 1 decapod; Cleveland, Cincinnati, Chicago & St. Louis, 5 passenger. The Dunkirk and Schenectady plants will build 62 of these locomotives for delivery during June and July, and the Montreal Locomotive Works, Ltd., will build nine for delivery in August.

The Ann Arbor has ordered 12 consolidation locomotives from the American Locomotive Co.

General Dimenstons.

Weight on drivers	188,000 lbs.
" total engine	213,000 "
Cylinders	22 in. x 30 in.
Diameter of drivers	57 in.
Boiler, working steam pressure	200 lbs.
Boiler, diameter	80 in.
Heating surface, tubes	3,318 sq. ft.
" " firebox	182 "
" " total	3,500 "
Tubes, outside diameter	2 in.
" number	425
" length	15 ft.
Firebox, length	108 in.
Firebox, width	66 "
Grate area	49.5 sq. ft.
Water capacity	8,000 gals.
Coal capacity	15 tons
Valve motion	Walschaerts

CAR BUILDING.

The Coahuila & Zacatecas is reported to be figuring on a number of gondola cars.

The Halifax & Southwestern has ordered two cafe-parlor cars from Rhodes-Curry & Co.

The Peoria & Pekin Union has ordered two passenger and one combination coach and smoking car from Barney & Smith.

The Canadian Pacific has ordered one steel coal car and one Hart-Otis ballast car from the Dominion Car & Foundry Co.

The Ann Arbor has ordered one cafe-parlor car and two passenger coaches from the Pullman Co. for delivery June 15, 1909.

The Red Springs Street Railway Co., Mt. Pleasant, Tex., is reported to be in the market for two 25-h.p. gasolene motor cars. This item is not confirmed.

The Interborough Rapid Transit Co., New York, is in the market for 100 company standard elevated train cars and 100 steel, center side-door, subway train cars.

The Canadian Pacific is building one baggage-express car, one mail-express car, 61 box cars and one stock car at its Angus shops, and one van at its Farnham shops.

The Western Pacific, reported in the *Railroad Age Gazette* of May 7 as being in the market for a number of passenger cars, will divide this equipment as follows: 50 passenger, 40 baggage, 10 buffet and 8 dining cars.

The Commissioners of the New Brunswick Railway & Coal Co. are inquiring for a second-hand combination baggage and first-class passenger car. They are also preparing to equip the balance of their freight cars with air-brakes.

The Pacific Electric Railway, Los Angeles, Cal., as reported in the *Railroad Age Gazette* of May 7, has ordered 50 thirty-ton side dump gondola cars from the Hicks Locomotive & Car Works. These cars will be 34 ft. long over end sills and 8 ft. 6 in. over side sills. The special equipment will include:

Axles	M. C. B. standard
Bolsters, body	Simplex
Bolsters, truck	Simplex
Brakes	Westinghouse
Brake-beams	Simplex
Couplers	Tower
Journal bearings	M. C. B. standard
Trucks	Diamond
Wheels	M. C. B. standard

The Atchison, Topeka & Santa Fe, as reported in the *Railroad Age Gazette* of March 26, has ordered nine baggage and four passenger coaches from the Pullman Co., for June delivery. The special equipment will include:

Bolsters, body	Commonwealth
Bolsters, truck	Steel
Brakes	Westinghouse
Brake-beams	Creco
Brake-shoes	National
Draft gear	Miner
Heating system	Chicago Car Heating Co.
Journal boxes	Symington
Lighting system	Pintsch
Springs	Simplex
Vestibules	Pullman
Wheels	Company standard

The Harriman Lines, reported in the *Railroad Age Gazette* of January 29 as being in the market for 1,500 refrigerator cars, have placed this order with the Pullman Co. for delivery about August 10. These cars will weigh 46,000 lbs. and have 60,000 lbs. capacity. They will be 33 ft. 2¾ in. long, 8 ft. 2¾ in. wide, 7 ft. 5⅜ in. high, inside measurements, and 40 ft. 11⅛ in. long, 9 ft. 6 in. wide and 12 ft. 11⅛ in. high, over all. The bodies will be of wood and the underframes of steel. The special equipment will include:

Axles	M. C. B. standard
Bolsters, body	Bettendorf
Bolsters, truck	Simplex
Brake-beams	National hollow
Brake-shoes	Am. Brake-Shoe & Fdry Co.
Brasses	Hewitt Mfg. Co.
Couplers	National Mall. Castings Co.
Draft gear	Miner
Journal boxes	National Mall. Castings Co.
Side bearings	Miner gravity roller
Springs	Railway Steel-Spring Co.
Trucks	Barber roller
Wheels	Cast-iron

The Boston & Maine, as reported in the *Railroad Age Gazette* of May 7, has ordered 1,000 forty-ton drop-bottom steel coal cars from the Laconia Car Co. These cars will be 40 ft. long, 9 ft. 5½ in. wide and 3 ft. 10 in. high, inside measurements, and 42 ft. 7½ in. long over couplers, 10 ft. 1 in. wide over all and 8 ft. 2¾ in. high over brake shafts. The special equipment will include:

Bolsters, body and truck	Steel
Brakes	Westinghouse, 10-in. cylinder
Brake-beams	I-beams
Brake-shoes	Steel back
Brasses	M. C. B. standard
Doors	Drop
Door fastenings	Standard Steel Car Co.
Draft gear	Miner tandem, E.
Dust guards	Wood, M. C. B. standard
Journal boxes	Malleable iron, M. C. B. standard
Paint	Metal, B. & M. standard
Side bearings	B. & M. standard
Springs, draft	Class G
Springs, truck	Class C
Trucks	Arch bar
Wheels	33-in. chilled

The Central of New England, as reported in the *Railroad Age Gazette* of May 7, has ordered two passenger, two smoking and baggage and two smoking, baggage and mail cars from the Wason Manufacturing Co. These cars will be 60 ft. 3½ in. long, 9 ft. 1 in. wide, 9 ft. 1 in. high, inside measure-

ments, and 68 ft. 8 in. long, 10 ft. ¼ in. wide and 13 ft. 8 in. high over all. The bodies will be of wood and the underframes of steel. The special equipment will include:

Bolsters, body	Double wrought iron
Bolsters, truck	Wrought iron
Brakes	Westinghouse
Brake-beams	Diamond special
Brake-shoes	Am. B. S. & Fdy. Co.
Couplers	McConway & Torley and Buhoup
Curtain fixtures	Forsyth
Curtain material	Pantasote
Dust guards	Harrison
Heating system	Gold
Lighting system	Acetylene
Platforms	Standard Coupler Co.
Seats	Heywood Bros. & Wakefield Co.
Seat covering	Green plush in passenger cars Pantasote in smoking cars
Side bearings	Creco
Springs	Railway Steel-Springs Co.
Wheels	33-in. rolled steel

IRON AND STEEL.

The Chicago, Milwaukee & St. Paul is figuring on about 400 tons of structural steel.

The Missouri Pacific has ordered 200 tons of structural steel from the Pennsylvania Steel Co.

The International & Great Northern is said to be in the market for 4,000 tons of 80-lb. rails.

The Toledo, St. Louis & Western has ordered 550 tons of structural steel for bridge work from the American Bridge Co.

The New York, Chicago & St. Louis has ordered about 1,400 tons of structural steel for grade crossing elimination work from the American Bridge Co.

General Conditions in Steel.—The inquiries for steel products continue to improve. Besides the large consumers, the small ones are also making inquiries, which latter condition is always taken as heralding general improvement. Probably no more definite idea of conditions can be gotten than from the following operating percentage, as reported in the *Wall Street Journal*: United States Steel Corporation, about 67.5 per cent. of capacity; Republic Iron & Steel Co., 100 per cent. of furnace capacity and between 75 per cent. and 80 per cent. of finished steel capacity; Lackawanna Steel Co., about 80 per cent. of capacity; Jones & Laughlin Steel Co., 80 per cent.; Pennsylvania and Maryland Steel companies, 75 per cent.; Cambria Steel Co., 75 per cent., and Carnegie Steel Co., about 85 per cent.

RAILROAD STRUCTURES.

CANADIAN STRUCTURES.—The contract for building the stations on the Grand Trunk Pacific between Winnipeg, Man., and Lake Superior junction, has been let to Contractor Vopni, Winnipeg, Man., price $114,000.

Bids will soon be asked by P. Ryan, Secretary of the National Transcontinental Railroad Commission, Ottawa, for the building of the following shops east of Winnipeg: Freight car shop, 200 ft. x 600 ft.; paint shop, 100 ft. x 325 ft.; coach shop, 125 ft. x 250 ft.; planing mill, 100 ft. x 300 ft.; lumber shop, 60 ft. x 115 ft., and dry kiln, 40 ft. x 50 ft.

CHICAGO.—The Chicago, Burlington & Quincy has given a contract for the erection of a one-story freight house to the Charles A. Moses Construction Co., Chicago. It will be of brick, 57 ft. x 702 ft.

EDMONTON, ALB.—Work on the high level bridge of the Canadian Pacific over the Saskatchewan river will be commenced within a month. The estimated cost of this structure is about $350,000. (March 26, p. 729.)

IOWA FALLS, IOWA.—The St. Paul & Des Moines is building a passenger depot.

MCHENRY, ILL.—The Chicago & North Western has given a contract for the erection of a passenger station to William Adams Construction Co., Chicago. It will be a one-story brick building, 21 ft. x 133 ft.

NEENAH, WIS.—Adolph Green, contractor, Green Bay, Wis., has been given a contract by the Chicago & North Western for two steel bridges across the Fox river near Neenah, Wis., and also for a steel bridge across Little Lake Buttes des Morts. The Buttes des Morts bridge will be about one mile long, and the combined length of the two Fox river bridges will be about one mile. These bridges will be double-track.

NEW CARLISLE, QUE.—The New Canadian Company, of New Carlisle, is said to be asking bids up to May 21 for the steel superstructures of 14 bridges, aggregating 4,900 ft., for the Atlantic, Quebec & Western.

PORTLAND, ME.—According to press reports plans are being made by the Grand Trunk to rebuild the pier and sheds destroyed by fire last December. (Dec. 11, p. 1564.)

SASKATOON, SASK.—The Canadian Northern will build a depot here to cost about $50,000.

SIGNALING.

The Central New England is going to try single-track operation without time-table and train-order rights, and has awarded to the Union Switch & Signal Co. a contract for the signaling of 15 miles of line for this purpose. This line is between Berea, N. Y., and Highland, west of the Poughkeepsie bridge. The signals will be controlled manual, with control apparatus from station to station, and also will be controlled by continuous track circuits. There will be 40 signals, all style B, electric motor semaphores. Those at the entrance to the sections will be absolute and be locked against the opposing entrance signals. To allow for following movements intermediate automatic home and distant signals will be employed. No permissive entrance signal indications will be given.

FOREIGN RAILWAY NOTES.

A concession has been granted by the Nicaraguan government to a firm to establish in western Nicaragua the cultivation of bananas for export, together with a line of steamers on the Pacific coast. The concession carries a grant of land, the privilege of constructing the necessary railways and docks for the proper handling of the banana crops, and also the free importation of all machinery, construction materials and supplies that may be required in establishing and conducting the enterprise. The address of the concessionaires is filed for reference at the Bureau of Manufactures, Washington, D. C.

According to a consular report, the Chilean government has several lines under construction, two important lines about to be let, and the following new lines are to be begun during the year at a total cost of $2,914,736 gold:

Lines.	Length, miles.	Gage Ft.	Gage In.	Cost.
Alcones to Pichilemu	44.88	5	6	$1,860,371
Linares to Panimavida	20.46	2	3.6	203,620
San Clemente to Colorado	17.36	3	3.36	236,220
Rancagua to Donihue	13.00	3	3.36	205,870
Selva Oscura to Cura Cautin	17.98	3	3.6	306,455
Union to Rio Bueno	7.44	2	3.6	102,200
Total	91.12			$2,914,736

The chief industry of the British colony of Southern Nigeria, on the west coast of Africa, is agriculture, and crops consist of maize (corn), plantains, groundnuts, yams and cassava, while cocoa, coffee and cotton are also grown. (It is reported by the British Cotton Growing Association that at present over 50,000 bales of cotton are grown annually in the Zaria and Kano provinces of Northern Nigeria, the physical hinterland of Southern Nigeria.) The natural products exported are palm oil and kernels, ivory, gum, copal and rubber, with a steady increase in the export of cotton and maize. A railway has been built from Iddo island to Oshogbo, on the mainland, a distance of 185 miles, and is now being extended to the Niger at Jebba, whence it will run to a point near Zungern, in Northern Nigeria, thus connecting with the railway from Kano in that protectorate, which has also been authorized. The principal imports are cotton goods, cooper's stores, hardware, cutlery and spirits. The total imports in 1906 amounted to $15,316,224, while the total exports amounted to $15,331,644.

Supply Trade News.

The C. F. Pease Blue Print Machinery & Supply Co., Chicago, has moved to 167 East Adams street, Chicago.

The Inter-Ocean Steel Co., Chicago, has ordered 5,000 tons of structural steel for its new plant from the Cambria Steel Co.

The Franklin Railway Supply Co., New York, has opened an office in Chicago at 115 Adams street. R. G. Coburn has been made resident Sales Manager in charge of that office.

Edwin J. Haddock has resigned as Chief Engineer of the Jeffrey Manufacturing Co., Columbus, Ohio, to engage in business for himself in Columbus, Ohio, as mechanical, structural and mill engineer.

The Empire Motor Car Co., Indianapolis, Ind., has been incorporated with $100,000 capital stock. The incorporators are: Carl G. Fisher, James A. Allison, Charles E. Test, A. C. Newby and Robert H. Hassler.

The Southern Wisconsin Power Co., Madison, Wis., recently installed a 30-ton traveling Northern crane and a 6-ton electric mono-rail hoist, both furnished by the Northern Engineering Works, Detroit, Mich.

W. L. Brown, formerly Assistant Engineer of Tests of the Pennsylvania Railroad, has gone to the sales department of the Geo. M. Newhall Engineering Co., Philadelphia, Pa. Mr. Brown's headquarters will be in Philadelphia.

The Case Crane Co., Columbus, Ohio, mentioned in our issue of last week as having changed its name from the Case Manufacturing Co., has appointed George B. Foster, with office in the Fisher building, Chicago, its representative in that territory.

P. H. Wilhelm, for some time with the American Steel & Wire Co., Cleveland, Ohio, and for a number of years engaged in selling railway supplies, has been appointed special railway representative for the Asbestos Protected Metal Co., Canton, Mass.

The Falls Hollow Staybolt Co., Cuyahoga Falls, Ohio, recently received a large order for Falls hollow staybolt iron from a railway in England. The railway wishes to give this staybolt iron a preliminary test with a view of its adoption on its entire system.

The Bucyrus Co., South Milwaukee, Wis., recently sold a locomotive pile driver and four ballast unloaders to the Southern Pacific. The company has also contracted to furnish another steam dredge for government service. It will be used on irrigation work in the state of Washington.

E. J. Arlein, who was formerly with the Patton Paint Co., Chicago, has resigned to accept the position of Western representative for James B. Sipe & Co., Pittsburgh, Pa., and will have headquarters in the Chamber of Commerce building, Chicago. Mr. Arlein succeeds Thomas D. Henderson, who died suddenly in the latter part of March.

The German American Car Co., of Chicago, and Warren, Ohio, is distributing a paper weight novelty—a bronze model of a steel under-frame tank car of the German American pattern. The company is a tank car "specialist," being the only concern engaged exclusively in building and renting tank cars. The paper weight is a miniature of the latest design of steel tank car.

Bids will be received by the Isthmian Canal Commission, Washington, D. C., until May 24, for supplying locomotive cranes, orange-peel buckets, pneumatic hoists, duplex pumps, pipe-threading machine, woodworking machines, flanging clamps, driving-wheel jacks, washer cutters, belt punches, malleable-iron castings, steel forgings, chain, steam and vacuum gages, park benches, lumber, etc. (Circular No. 508.)

The Rogers Journal Packing Co., Chicago, has appointed Willis C. Squire, 307 Western Union building, General Sales Agent for the Rogers improved journal packing and receptacles. All orders for Rogers packing should be sent to the general sales office. The company is now making an improved journal packing, using the original Rogers steel wool in combination with a high grade cotton waste mixed with sponge, and is prepared to fill orders in any amount for this packing.

An American consular officer in a Latin-American country reports that it is possible that a few miles of narrow-gage railway, together with a small wharf and customs-house buildings, will shortly be constructed in the city in which he is located. If American firms interested in this project desire to send to him catalogues of implements, railway supplies and other material needed, he will see that they get into the hands of the proper persons. (Inquiry No. 3347, Bureau of Manufactures, Washington, D. C.)

On all of the new coaches for the New York Central Lines, ordered recently from the Pullman Company, the American Car & Foundry Co. and the Barney & Smith Car Co., Edwards window design No. 7-D-2, made by the O. M. Edwards Co., Syracuse, N. Y., will be used on windows that have double sash, and design 7-D-1 on all windows with single sash. These fixtures are to be furnished in statuary bronze finish to conform in color with the rest of the car fittings. Orders have also been received from the Silliker Car Co. and from Rhodes, Curry & Co. for window fixtures for Canadian Northern Railway equipment.

L. E. Burton is now in charge of sales of the American Blower Co., Detroit, Mich., in the states of Washington, Oregon and Idaho, with headquarters at the Arcade annex, Seattle, Wash. Mr. Burton is a graduate of the Engineering Department of the University of Michigan and has had considerable experience as engineering salesman for the company at Detroit and in connection with the Chicago office. His later experience consists of engineering positions with J. T. Mooney & Co., Nashville, Tenn., and more recently with the W. J. McPherson Co., Portland, Ore. Thomas W. Fitch, until recently sales manager of the Capell Fan & Engineering Co., is now connected with the American Blower Co., representing the Sirocco mine fan department in the bituminous coal district. Mr. Fitch makes his headquarters at the Pittsburgh, Pa., sales office.

Henry B. Robischung died suddenly of apoplexy at his country home, Guernsey Lake, near Kalamazoo, Mich., on May 3. Mr. Robischung was born in Scottsville, N. Y., on May 28, 1850, and was taken to Kalamazoo when two years old, and while his business called him to various parts of the country, he always maintained Kalamazoo as his home. He was Master Mechanic of the old Cincinnati, Wabash & Michigan, now part of the Cleveland, Cincinnati, Chicago & St. Louis, and was one of the first to apply the Eames vacuum brake. He was with the company that made this brake and with Thomas Prosser & Sons, New York, until 1885, when he was employed by E. B. Leigh, then managing the American Brake Company, St. Louis, Mo. He remained with this company until the latter part of 1887. For nearly a year he did special work for the Campbell Printing Press Co. On the reorganization of the National Hollow Brake Beam Co., he was again employed by Mr. Leigh, this time as Superintendent of this company. He remained with the National Hollow Brake Beam Co. and its successor, the Chicago Railway Equipment Co., Chicago, until 1898, when he retired from active work, remaining with the Chicago Railway Equipment Co. in a consulting capacity, however, up to his death. He was a great leader in the development of the metal brake beam; he was the original inventor of the steel back brake shoe, and more than 50 patents were taken out in his name. There is hardly a railway in the country that is not using equipment devised or improved by him. He was a superior mechanic, and was generally and favorably known to the older railway men. His death will be regretted by a large circle of friends.

German Roads.

It has been proposed to build, by a private company, a high-speed electric railway for passengers only between Dusseldorf and Dortmund, already connected by the State Railways. The Railway Minister, to whom the plan must be submitted, has intimated that he will be inclined to disapprove of such a plan to invade the state's traffic.

TRADE PUBLICATIONS.

Hollow Staybolts.—The Detroit Seamless Steel Tube Co., Detroit, Mich., has issued a pamphlet on its hollow staybolt for locomotive, marine and other types of boilers. This is a new product of this company.

Steel-Tired Wheels.—The Standard Steel Works Co., Philadelphia, Pa., has just issued a catalogue which contains a large number of half-tone cuts showing elevation and cross-sectional views of the steel-tired car wheels which it manufactures.

An Address.—The Chicago Railway & Equipment Co., Chicago, is mailing a convenient sized pamphlet containing a re-print of a paper read by E. B. Leigh, President of the company, before the American Malleable Castings Association at the Auditorium Annex, Chicago, in November, 1908.

"Camping in the Rockies."—Under this title a guide to the most desirable hunting, fishing and outing places in Colorado, Utah and New Mexico, called "the playground of America" by ex-President Roosevelt, an attractive little booklet, is being distributed by the passenger department of the Denver & Rio Grande.

Highway Roads.—The Barrett Manufacturing Co., New York, has just issued an attractive catalogue which contains a large amount of information regarding the building and preservation of macadam roads and the prevention of dust. A number of full-page half-tone illustrations show sections of a large number of roads treated with Tarvia, a preparation made from coal tar.

Northern Pacific.—The passenger department of the Northern Pacific is distributing Homeseekers' Pamphlet No. 1. It shows a large map of the territory served by the Northern Pacific and contains a list of homeseekers' excursion fares from eastern gateway points to stations in North Dakota, Montana, Idaho, Washington, Oregon and British Columbia, to which these fares apply. These stations are arranged in alphabetical order.

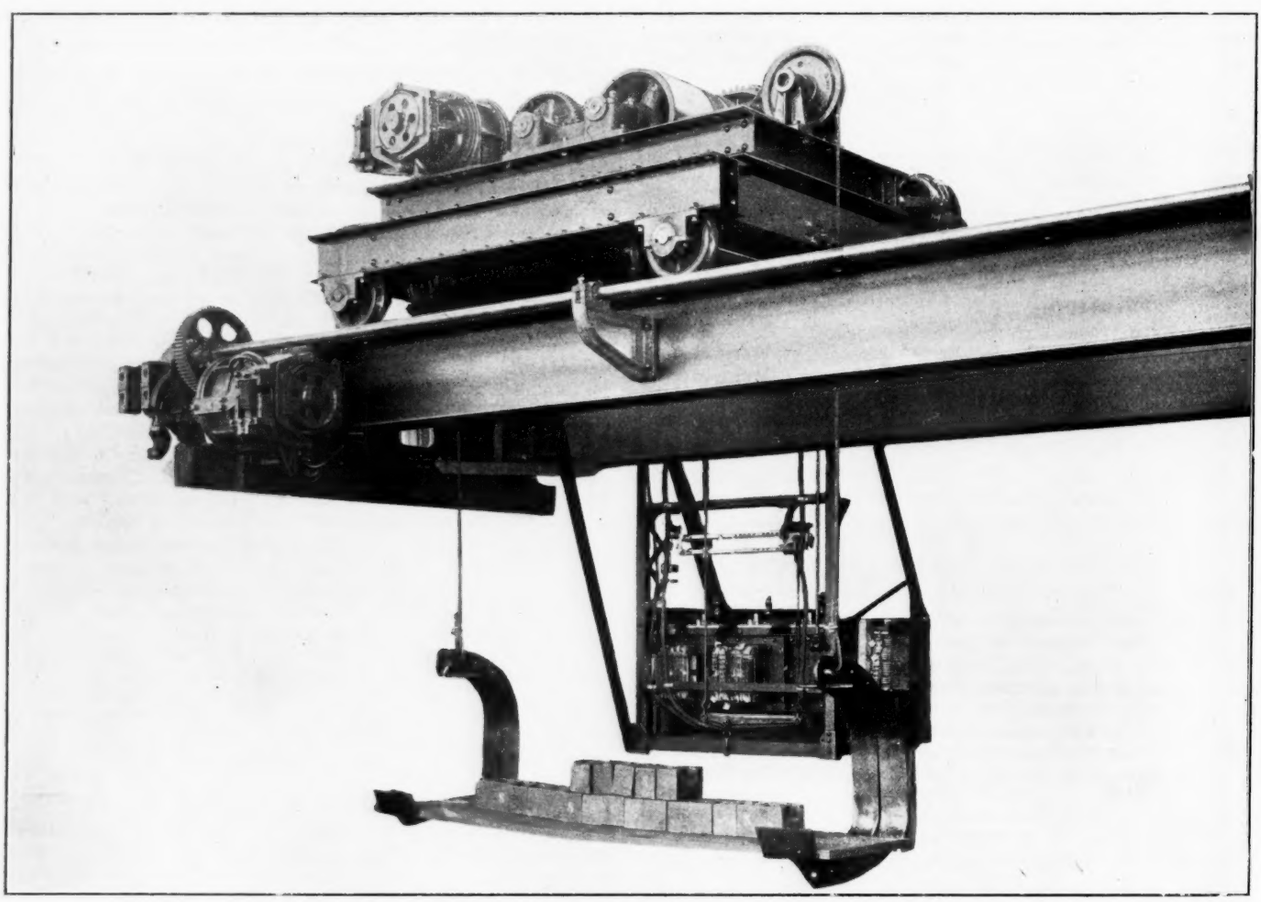
Denver & Rio Grande.—The passenger department is distributing an illustrated circular relating to the National Encampment of the Grand Army of the Republic, which will be held at Salt Lake City August 9 to 14. Attention is called to various points of interest along this line. The illustrations include reproductions of photographs of all the Commanders-in-Chief from 1866 until the present time.

Chicago & North Western.—A folder describing the plans for the Alaska-Yukon-Pacific Exposition and the grounds and buildings, giving the special railway rates made from the East to Seattle, and describing the many points of interest to which side trips may be made, is being circulated. The folder contains a large amount of valuable information for the prospective traveler.

Railway Jacks.—The Joyce-Cridland Co., Dayton, Ohio, is issuing an attractive series of bulletins describing various lines of jacks suitable for railway use. Bulletin No. 25, on the subject of screw and traversing jacks, is ready for distribution, as is Bulletin No. 32, describing various kinds of track jacks. The latter bulletin describes a new jack suited for track leveling, and contains interesting information regarding the operation of automatic jacks.

Three-Motor Electric Traveling Scale Crane.

A new type of scale crane is shown in the accompanying illustration. The novel feature of this crane consists in the application of the scales for weighing material, which are supported on the trolley truck frame and carry the hoisting mechanism mounted on an independent steel framework. The scale beams are in the cage suspended from the trolley, and readings are taken and recorded by the crane operator. There are three beams—two scale beams with self-recording poises, and one tare beam, enabling scale weights of several different items of material to be determined easily and accurately. A simple movement of a hand lever transfers, when desired, all load from the knife edges of



Whiting Three-Motor Electric Traveling Scale Crane.

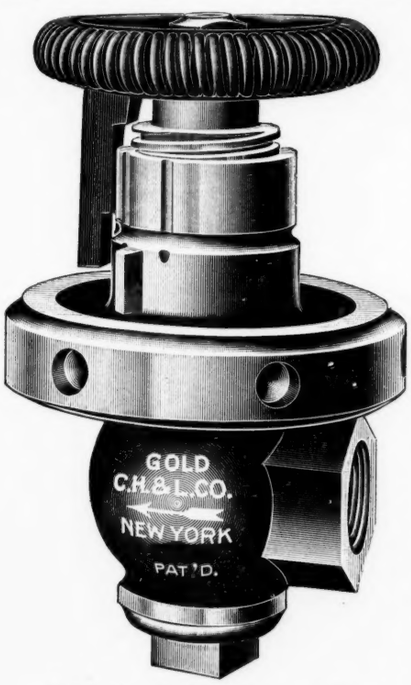
the scale to the trolley truck frame, operation then being the same as with an ordinary trolley.

The previous method of crane weighing involved hanging a scale device on the hook. This required a special man to read, enter and calculate weights and deduct the tare, a process much more laborious than with the new arrangement, which also eliminates the liability of personal error. The scale device on the hook also occupied considerable head room, often a consideration of importance.

An open-side platform is furnished for carrying long pieces, such as rods, bars, etc. The design of this platform is made to suit the material to be handled. A crane of this type is most useful in loading material, checking invoiced weights, and in loading for shipment, for inventory, etc. Application has been made for a patent covering the essential features of this design. The Whiting Foundry Equipment Co., Harvey, Ill., is the maker. Six of these cranes, of five tons capacity each, 37 ft. 10¾-in. span, worked by alternating current, have been built for the new warehouse of the Scully Steel & Iron Co., Chicago.

Gold Stop Valve Temperature Regulator.

It is necessary to provide some means for regulating the steam pressure in each car in order to satisfactorily heat a passenger train by steam from the locomotive. This may be accomplished with ordinary stop valves, but such are not highly practicable, since they require constant attention to prevent the radiating pipes from receiving full train-line pressure. The result is that the forward cars of the train use so much steam that unless an excessive train-line pressure is carried, the rear cars do not receive sufficient steam to keep them properly heated. To meet this condition the stop-valve temperature regulator here shown was designed. This regulator may be set to supply any pressure up to 20 lbs., which is sufficient to heat a car in the coldest weather. It may also be used as a stop valve, so that the steam may be shut off entirely. This regulator occupies the same position in the piping as does the ordinary inlet valve. The handle is supplied with an indicator in which a spring is inserted to hold the valve in any desired position. No steam gage is necessary, since a single turn of the wheel gives 20 lbs. pressure, a half-turn, 10 lbs., and any intermediate position a corresponding pressure.



Gold Stop Valve Temperature Regulator.

With this device, the train-line pressure may be materially reduced. It is claimed that where the entire train is equipped with these regulators, the train-line pressure necessary to maintain sufficient steam has been reduced to 50 per cent. of that formerly carried. This results in a great saving of steam and steam hose, and relieves all parts of the heating equipment from excessive strain. The regulator is made in both straight-way and angle types; the latter, illustrated herewith, being used for passenger car coils, and the former for baggage and express cars. All parts of the two types are interchangeable.

In operation, steam from the train line enters in the direction of the arrow and passes through a strainer, which protects the valve seats from dirt or grit. As the wheel handles is turned from left to right, a spring, acting through a diaphragm, opens two valves and admits steam to the radiator. After the required pressure has been delivered, any increase will overcome the tension of a large coiled spring in the top of the regulator, and this permits a small spring at the bottom to lift two balanced valves to their seats, thus cutting off the admission of steam. As the pressure decreases in the radiator, it also decreases under the diaphragm in the central portion of the regulator, and the tension on the large spring again forces the two balanced valves downward, holding them in this position and admitting sufficient steam to compensate for the amount lost by radiation. When the required pressure is again delivered, the valves close automatically as before. If additional heat is required, the pressure must be increased. To do this, the wheel handle is turned farther to the right. If lower temperature is desired, it should be moved in the reverse direction. When the wheel handle is turned back to the stop, the valve is closed. An auxiliary valve permits a limited supply of steam when the occasion so demands.

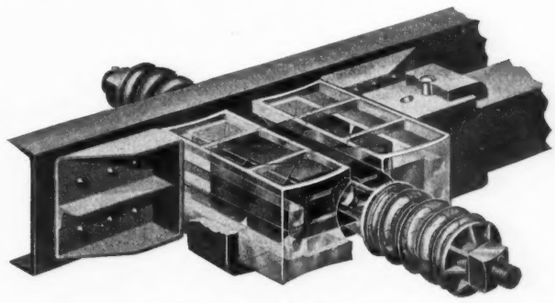
Before applying these regulators all pipes should be blown out with steam to free them from dirt and scale. A strainer nipple is screwed into the cross, fitting in such a manner that it extends a short distance into the train line. When the strainer is so placed, the steam, in passing through the train line, will keep it perfectly clean. This regulator can be applied to any car heating system.

Location of Regulator and Piping in Passenger Coach.

This device is made by the Gold Car Heating & Lighting Co., New York.

Cardwell Friction Gear.

The Union Draft Gear Co., Chicago, was recently organized with the following officers: James R. Cardwell, President and General Manager; Charles A. Jennings, Vice-President; John D. Ristine, Secretary and Assistant Treasurer; C. H. Tobias, Treasurer and Assistant Secretary. The company, which has a paid up capital of $2,000,000, has bought the draft gear patents and business of the Cardwell Manufacturing Co., Chicago, and will continue the manufacture and sale of the friction draft gear which was started by this company in the latter part of 1904. The Cardwell friction gear was described in the *Railroad Gazette*, June 8, 1906. Although the Cardwell company pursued a careful and conservative policy in the production and sale of its gear, it has equipped many thousands of cars. The results in service have shown the value of the gear and its effect in saving in the cost of maintenance of car equipment.



Cardwell Friction Gear.

The evolution of draft gear has shown that a gear for simply cushioning the blow when cars are bumped or jerked will not suffice, but that the gear must absorb the blow. Reports of drop tests recently made of Cardwell friction gear show that a blow of 1,660,500 lbs. is reduced to 115,312 lbs. in passing through it, and a blow of 1,037,812 lbs. is reduced to 15,375 lbs. It is the failure of draft gears thus to absorb buffing shocks that adds so greatly to repair bills. The Cardwell gear is designed to reduce by one-half the speed of the blow or impact in transmitting it to the car. This reduces the force of the blow to one-fourth. This fourth is resisted by springs on a floating spring rod, actuated by the operation of twelve transversely-acting friction faces which continue the work of absorp-

tion, so that the ultimate shock to the car frame is enormously reduced.

Another feature of merit claimed for this draft gear is ease of application. The springs are applied after the gear is put on, so that there is no trouble in placing the gear between the draft lugs. The springs are on the outside of the center sills and therefore easily accessible, so that in case of a broken spring all that has to be done to remove and replace it is to take off one nut. Also, the springs are in plain view of the inspector every time he looks over the car. Other claims are: that the gear is designed on highly practical engineering lines and is adaptable to any class of equipment; the parts are strong and simple, and the design such as to be automatically adjustable and no lost motion need occur in it. The description of the gear previously published showed a diagram of a compression test of the gear, made by R. W. Hunt & Co., Chicago. The release line dropped vertically to about 5,000 lbs., from which point horizontal movement of the coupler began.

The Union Draft Gear Co. starts in business with a large number of contracts, with considerable orders on hand, and with unfinished business amounting to equipment for more than 9,000 gears. Its principal business will be the manufacture of the Cardwell friction draft gear, but it will also sell spring draft gears where they are desired.

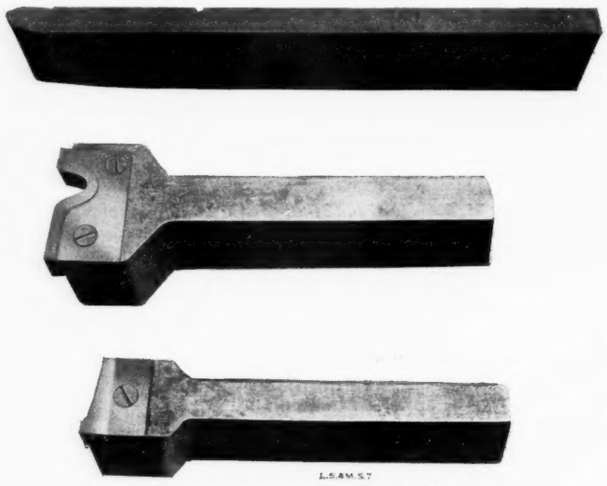
Pond Lathe for Steel-Tired Car Wheels.

The accompanying illustration shows a recent design of lathe for turning steel-tired car wheels. Actual results show this machine capable of turning from 12 to 14 pairs of 42-in. wheels a day. This is not an average obtained from tests, seeking to establish the output of the machine under special conditions, but rather that showing results of everyday working conditions. Test results are vitally interesting only as such, while everyday results show what may be expected in actual output.

This lathe permits of rapid and easy placing and removing of a pair of wheels. Rails are placed so that the wheels may be run into the machine from the rear and at the exact height of the tail-stock centers, the face plates being cut away to accommodate the axle. The latest form of "sure grip" diving pieces are used, which have independent adjustment by convenient set screws. The floor in front of the lathe is often depressed to form a pit for the operator.

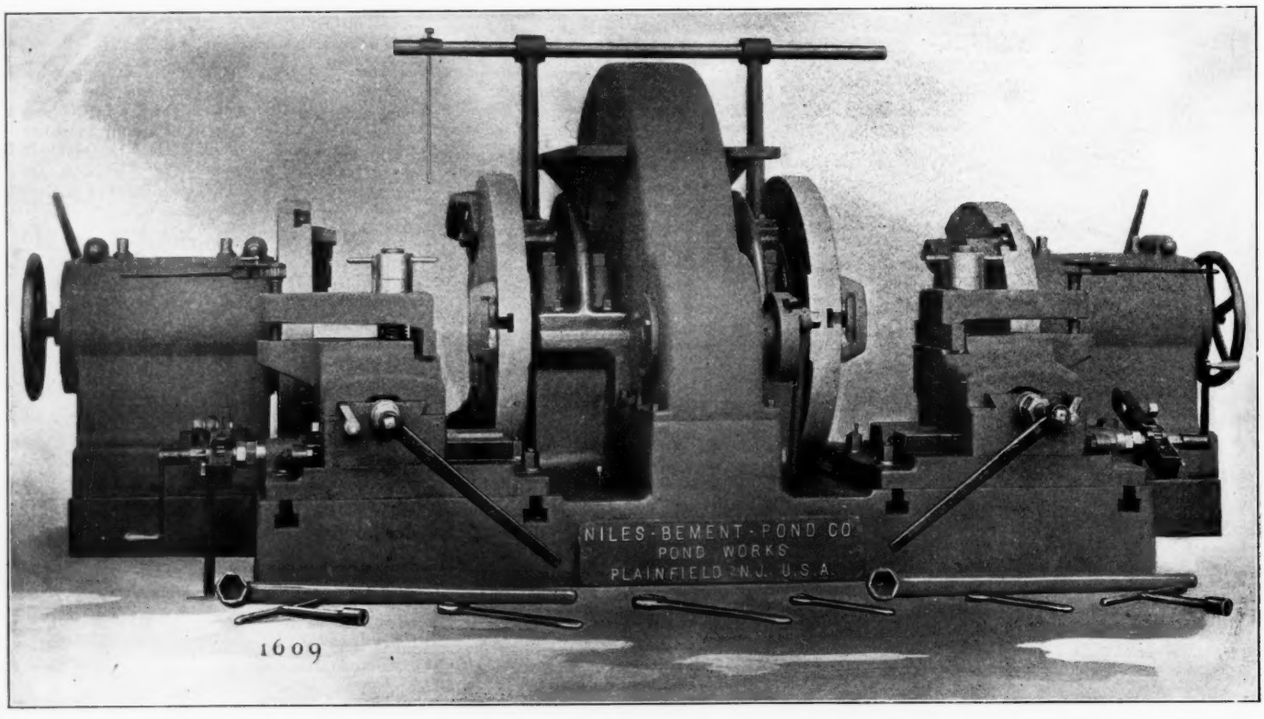
ing screw is moved through the ratchet handle shown. The coil spring frees the tool for removal.

The number of tools required for tire turning is also reduced by the use of the three designs shown. The roughing tool is first used at about ¼-in. to ¾-in. feed across the tread at a speed of about 15 ft. to 20 ft. per minute. This same tool is used in roughing both sides of the flange in one setting. The combination flange and tread tool is



Set of Tools for Pond Car Wheel Lathe.

then used, and about three revolutions should finish the flange and part of the tread. The chamfering and beveling tool should finish the outside of the tread in from two to three revolutions. The clamp bolts which hold the tires against the drivers may be loosened during the last revolution of the lathe. Each lathe should be provided with a full set of tools to provide for dressing and grinding. This set includes six or eight roughing tools, both right and left handed, made



Pond Lathe for Steel-Tired Car Wheels.

A feature of this machine, and one which greatly assists in increasing output, is the single-screw tool clamp used. With this clamp it is necessary to tighten and release but one screw, which permits of great saving in time over those tool clamps having a loose plate held in position by four bolts. The illustration shows this tool clamp to have an adjusting nut near the end which binds the tool. This is set by hand, and the lever is tightened by lifting the opposite end. The washer under the adjusting nut becomes the fulcrum, and the tightening

of 3-in. x 1½-in. air hardening steel; one of each design of tool stock and at least two of each design of scraper. The two finishing tools have wrought iron tool stocks and air hardening steel blades or scrapers for the cutting edges. The combination flange and tread tool cutting edge is made to the contour of the M. C. B. standard gage, usually with a milling cutter.

These lathes are made by the Niles-Bement-Pond Co., New York, at its Pond Works, in Plainfield, N. J.